Medicine Quiz 2

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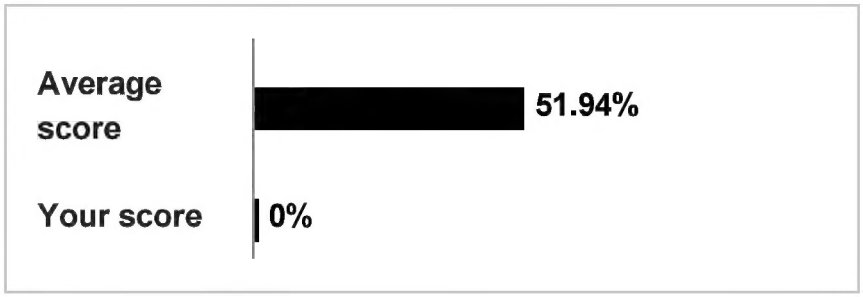

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Answered Review

1. Question **1 points**

A 56-year-old man presents himself to a walk-in clinic complaining about tiredness, muscle weakness, polyuria, and nocturia. The triage nurse finds his blood pressure is 220/125 mm Hg. Recognizing a potential medical emergency, she immediately introduces him to the physician on duty. That physician treats him with nitroglycerine, which brings the readings down to 175/90 mm Hg. He also gives him a few extra nitroglycerine pills, plus prescriptions for hydrochlorothiazide and verapamil and tells him to make an appointment with a physician who can treat him on a regular basis because he suspects that he may be suffering from a serious condition. Taking his advice, the patient makes an appointment at a local free clinic. At this time, his sense of muscle weakness has increased, as has his general feeling of fatigue. In addition to the symptoms above, he now also suffers from muscle cramps and constipation. His new physician finds his blood pressure to be 190/95 mm Hg, and he also notes a mild cardiac arrhythmia; blood serum analysis was normal except for his serum K^+ level, which is 3.1 mm/L. The patient claims he has been taking the pills prescribed by the doctor at the walk-in clinic on a regular basis. Which of the following conditions does this patient most likely suffer from?

1. Essential hypertension
2. Conn syndrome ✔
3. Addison disease
4. Cushing syndrome
5. Pheochromocytoma

INCORRECT ✖

The correct answer is 2.

Conn syndrome is an important example of a secondary hypertension, in this case caused by aldosteronism. Although some studies suggest it is a rare condition, careful studies find it to be the cause of up to 15% of the cases of hypertension and should be suspected in all cases resistant to treatment or accompanied by low serum K^+ levels. It is caused by either an adenoma (a nonmalignant aldosterone-producing tumor in one of the adrenals), or by bilateral adrenal hyperplasia. The former is readily treated by surgery, while the latter generally may be treated with spironolactone, an aldosterone antagonist. The condition is diagnosed by measuring serum aldosterone and renin levels. In Conn syndrome, aldosterone concentration is elevated while the renin level is not in fact, it usually is very low. As people age, their blood pressure tends to increase. In fact, in the 1940s, normal systolic blood pressure was regarded to be 100 mm Hg plus a person's age. Now, normal pressure is defined in terms of the risk for organ damage. Thus, normal pressure for otherwise healthy adults is defined as shown in the following table:

	Systolic		Diastolic
Normal	<120	And	<80
Prehypertension	120–139	Or	80–89

High blood pressure			
Stage 1	140–159	Or	90–99
Stage 2	≥160	Or	≥100

(Choice 1) For persons with diabetes or chronic renal disease, high blood pressure is defined as greater than 130/80 mm Hg because of the greater potential for end-organ damage. Roughly about 30% of adults over the age of 18 years have hypertension as defined in this table. In most cases, there is no specific cause for these higher-than-normal values, and this is called essential hypertension. In general, essential hypertension can be distinguished from Conn syndrome by the observations that (a) the degree to which the pressure is raised is not as great as in Conn syndrome, (b) the pressure responds more readily to medication, and (c) the serum K^+ level stays within normal limits. Thus, patients with essential hypertension are less likely to have symptoms due to serum K^+ deficiency.
(Choice 3) is caused by the underproduction of adrenal gland hormones, usually due to an autoimmune reaction. Symptoms usually develop gradually and include low blood pressure, muscle weakness, bronzing of the skin, weight loss, and fatigue.
(Choice 4) is caused by chronic exposure of the body to excess cortisol. It sometimes occurs as a consequence of long-term treatment of various conditions with cortisol; when it occurs spontaneously, it is due to a pituitary adenoma in 70% of the cases. These benign tumors secrete excess adrenocorticotropic hormone (ACTH). Usually, a single tumor is present, and the disorder is called Cushing disease. The syndrome may also be caused by ACTH-producing tumors found outside the pituitary. These ectopic tumors are found in association with small-cell lung cancers more than half the time, but may also be caused by thymomas, medullary carcinomas of the thyroid, and pancreatic islet cell cancers. Excess cortisol may also arise from carcinoid cells, essentially developmentally misplaced adrenal tissue. Cushing syndrome also may arise from an adrenal adenoma; these nonmalignant tumors are approximately five times more common in females than males and usually first appear at about the age of 40 years. Malignant adrenal cortical tumors are the least common cause of Cushing syndrome. In addition to secreting very high levels of cortisol, such tumors also usually secret adrenal androgens.
(Choice 5) Unlike the other choices, a pheochromocytoma is a tumor located in the adrenal medulla rather than the cortex; consequently, these tumors secrete excess amounts of the catecholamines (epinephrine, norepinephrine, and dopamine) and their metabolic products. Symptoms of a pheochromocytoma are those expected to be caused by excess levels of circulating catecholamines, including high blood pressure, but generally also including other symptoms, such as severe headaches, tachycardia and palpitations, severe anxiety including feelings of impending death, tremors, chest and/or abdominal pain, nausea, weight loss, and heat intolerance. The classical diagnosis is analysis of a 24-hour urine sample for excreted catecholamines plus their metabolic products. More recently, a blood test has been developed. Although not as sensitive and not as widely available, this test is simpler for the patient to take.

2. Question **1 points**

A 68-year-old man presents to the emergency room of a small-town hospital with a history of crushing substernal chest pain that occurred while he was watching television. The patient gave a history of chest pains that came and went, which he had chosen to ignore, but this was his first severe episode. He did not smoke, drank alcohol in moderation, and had been retired for 4 years. He had no past history of medical illness or long-term medications. In the emergency room, his temperature was 37°C (98.4°F), pulse was 100/min regular, and blood pressure was 140/60 mm Hg. His respirations were 20/min. The patient was diaphoretic and had pallor and a hint of peripheral cyanosis. He was given 100% oxygen by nasal canula at 4 L/min, morphine for pain, sublingual nitroglycerin, and aspirin. An electrocardiogram (ECG) showed an inferior myocardial infarct (MI) based on ST changes in leads II, III, and AVF. As percutaneous coronary intervention was unavailable, and the event was less than 6 hours in duration, thrombolytic therapy was carried out. Thereafter, he was transferred to the coronary intensive care unit. On the fourth day post-MI, he complained of severe substernal pain similar in intensity and character to the one that heralded the first event. Positive physical findings included a third heart sound and bibasilar rales. Pertinent negative findings included the absence of a murmur and friction rub. Laboratory studies revealed the presence of creatine phosphokinase isoenzyme CKMB and a lactate dehydrogenase (LDH) isoenzyme study with an LDH_1/LDH_2 flip. Which of the following findings is the most specific indication of reinfarction?

1. Recurrent pain
2. A third heart sound
3. Bibasilar rales
4. The presence of creatine phosphokinase isoenzyme CKMB ✔
5. A lactate dehydrogenase (LDH) isoenzyme LDH₁/LDH₂ flip

INCORRECT ✖

The correct answer is 4.

Creatine phosphokinase (CPK) is a dimeric protein predominately found in skeletal muscle, brain, and heart. The subunits of the skeletal muscle isozyme are called M-type and the intact dimer is called CPK-MM or CPK-3; the brain isozyme is composed of two B-type subunits and is called CPK-BB or CPK-1, whereas the heart isozyme is formed from one B-type subunit and one M-type subunit and is called CPK-MB or CPK-2. Since the myocardium is the only tissue that expresses the MB hybrid at a significant concentration, an increase in the circulating level of the MB isozyme specifically signifies damage to heart muscle. After a myocardial infarct (MI), the MB starts to rise within 3–8 hours, peaks in 12–24 hours, and returns to normal in 12–48 hours. Thus, its presence 4 days after the initial infarct signifies reinfarction.

(Choice 1) could be due to reinfarction, gastroesophageal reflux, or a vivid imagination.

(Choice 2) is usually a low-pitched sound that is apical in location. It is physiologic in children. However, after the age of 30, it signifies volume overload or left ventricular failure.
(Choice 3) usually occur in congestive cardiac failure. The patient would be dyspneic and may have cyanosis and distended jugular veins. In patients with extensive myocardial infarction, bibasilar rales and a third heart sound could result from the reasons elaborated above.
(Choice 5) is not correct. Lactate dehydrogenase (LDH) isoenzymes are composed of tetramers of H and M polypeptides. These polypeptides form five distinct isoenzymes, which are numbered from 1 to 5. These isoenzymes are tissue specific. LDH_1 and LDH_2 are primarily located in the red blood cells, cardiac muscle, and the kidneys. LDH_3 is located primarily in the lungs, whereas LDH_4 and LDH_5 are found in the skeletal muscles, skin, and liver. The wide distribution of these enzymes therefore limits their usefulness in testing. However, in myocardial infarction, they are useful in ruling out other causes of chest pain. The proportion of these polypeptides varies from tissue to tissue. In normal serum, LDH_2 is in greatest concentration and that of LDH_1 exceeds LDH_3; the concentrations of LDH_3 and LDH_4, on the other hand, are almost equal to one another. The proportional concentrations of LDH_1 and LDH_2 in red blood cells and myocardial tissue are as follows:

Location	Activity of LDH₁	Activity of LDH₂
Red blood cell	Low	High
Cardiac muscle	High	Low

Therefore, in normal situations, the concentration LDH_1 in the serum will remain low, and that of LDH_2 high, because there is no myocardial damage, and even though there is no hemolysis, more of the enzyme leaks out of erythrocytes. Following myocardial tissue damage, LDH_1 will spill into the blood. As a result, the concentration of LDH_1 in the serum will exceed that of LDH_2, resulting in the flip. The LDH_1/LDH_2 flip has a sensitivity of 80% and a specificity of 95%. However, it is first evident 14 hours post-MI, peaks in 2–3 days, and disappears in 7 days. Therefore, in this patient, who is 4 days post-MI, one would expect to find an LDH_1/LDH_2 flip even in the absence of reinfarction, as the flip remains for up to 7 days. Therefore, in this case it does not contribute to the diagnosis of reinfarction.

3. Question

1 points

A 56-year-old grandmother whose hobby is gardening presents with a red swelling in her right ring finger. She does not remember any specific trauma to the area, but frequently sustains small cuts on her hands while tending to her garden. Physical examination reveals a small, red, nontender papule on the right ring finger, which shows erythema and swelling, with a small draining pustule on

the lateral side. There are ascending erythematous streaks up the right arm, with several draining pustules along their course. Bacterial cultures are negative. Which one of the following is the most effective medication, and most likely to be well-tolerated by this patient?

1. Itraconazole ✔
2. Saturated solution of potassium iodide
3. Amphotericin B
4. Erythromycin
5. Dicloxacillin
6. Cephalexin

INCORRECT ✖

The correct answer is 1.

The disease described is cutaneous sporotrichosis, caused by the fungus Sporothrix schenckii. This fungus is found on plants and in the soil in many areas and can cause infection when minor trauma inoculates the fungus into subcutaneous tissue. Spread of the infection along lymphangitic Channels is common and accounts for ascending erythematous streaks up the right arm with several draining pustules along their course, as described in the case history. However, extra cutaneous forms of infection are rare. Pain is unusual. Diagnosis is confirmed by culture of a skin biopsy or, when present, pus from a draining pustule. Without treatment, the infection becomes chronic and usually does not heal. Itraconazole has become the drug of choice for cutaneous and most other types of infection with S. Schenckii.

(Choice 2) Historically, a saturated solution of potassium iodide (SSKI) had been the preferred treatment. Although it remains relatively inexpensive, most clinicians prefer itraconazole because SSKI is poorly tolerated by many patients and although controlled comparative studies apparently have not been conducted, it may not be as effective as itraconazole or other available oral azole antifungals.

(Choice 3) is primarily used as initial treatment for extra cutaneous forms of S. schenckii infection.

(Choices 4,5 & 6) Erythromycin, dicloxacillin, and cephalexin are antibiotics used to treat bacterial, not fungal, infections.

4. Question **1 points**

A 35-year-old businessman comes to see his primary care physician for a complete physical. The patient has no medical history suggestive of hypertension, diabetes, seizures, or other chronic disease. He does consume ibuprofen tablets for “tension headaches” due to pressures caused by

his job. He does not have chest pain, nor does he have a history of shortness of breath. There is no family history of chronic medical illness. Physical examination reveals a well-nourished male, who is afebrile and has normal vital signs. He has no pallor, cyanosis, or icterus. Examinations of his cardiovascular and respiratory systems show normal findings. Findings of his abdominal examination are normal as well. During his interaction with his primary care physician, he stated, rather warily, that he visited a prostitute on one of his travels and did not use protection. Examination of his genitalia did not reveal any abnormal physical findings. He was tested for sexually transmitted disease. His human immunodeficiency virus (HIV) enzyme-linked immunosorbent assay (ELISA) test result was negative, as were results of the tests for chlamydia and herpes genitalis. His serum rapid plasmin reagin test result (RPR) showed a reaction at 1:10, and the microhemagglutination-Treponema pallidum (MHA-TP) showed a reaction as well. Which one of the following statements about this patient is true?

1. He should be treated with procaine penicillin.
2. He must have syphilis because the RPR test is specific.
3. The RPR assay should become nonreactive between 12 and 24 months after treatment. ✔
4. His disease is not communicable, and his sexual partners do not need testing.
5. The MHA-TP should become nonreactive within 6 months after treatment.

INCORRECT ✖

The correct answer is 3.

The diagnosis of syphilis is usually made by serology. This patient has latent syphilis because he has no physical findings that point to the disease, but has a positive result for a screening test that is highly sensitive. The highly sensitive nontreponemal tests (aka, reagin tests), namely the Venereal Disease Research Laboratory test (VDRL) and the similar Rapid Plasmin Reagin test (RPR), are used for initial screening and to monitor treatment; they usually become nonreactive after 1 year of treatment. They are called nontreponemal because they are directed against a cardiolipin–lecithin–cholesterol antibody and not against the spirochete itself. False-positive VDRL and RPR test results occur in many conditions, but the titers rarely exceed 1:8. In those who are suspected of having the disease, titers above 1:8 have a false-positive incidence of 1%–3%. Patients with human immunodeficiency virus (HIV) infection and IV drug users may have concomitant syphilis. Treponemal tests, those that target the spirochete itself, such as the fluorescent treponemal antibody absorbed test (FTA-ABS) and microhemagglutination-Treponema pallidum test (MHA-TP) are highly specific. They confirm syphilis when nontreponemal tests are positive, identify false-positive VDRL and RPR results, and, unlike the nontreponemal tests, remain positive even after therapy. Evaluation for neurosyphilis by examining the cerebrospinal fluid obtained via lumbar puncture is recommended for those with neurologic symptoms and signs. Other

indications include untreated syphilis, failed therapy, disease for more than 1 year, or a serum VDRL or RPR titer above 1:32. Cerebrospinal fluid examination should also be done in patients with a positive VDRL or RPR result after 1 year of treatment.
(Choice 1) is incorrect. Because of the organism's unusually slow rate of multiplication, a long exposure to medication is required. Therefore, short-acting penicillins, such as procaine penicillin, will be ineffectual. The treatment of choice for primary, secondary, or early latent syphilis is penicillin G benzathine. For neurosyphilis, the treatment is aqueous penicillin G or aqueous penicillin G procaine with oral probenecid. Tetracycline is approved for treatment of patients who are allergic to penicillin. Treatment should be monitored by determining quantitative VDRL or RPR titers repeated in the first, third, sixth, and twelfth month. If the titer rises, or it fails to fall fourfold, or if the symptoms recur, the patient should be retreated and cerebrospinal fluid examined to exclude the presence of neurosyphilis.
(Choice 2) is incorrect because RPR is not a specific test but a sensitive one.
(Choice 4) is incorrect because the disease is communicable, and sexual partners should be tested.
(Choice 5) is incorrect; treponemal test results remain positive even after treatment.

5. Question

1 points

A 25-year-old man presents with complaints of dysuria for the past 6 days. He has had multiple female sexual partners in the past 2 months. Physical examination shows a yellowish penile discharge with inguinal adenopathy but no genital ulcers. Gram's stain of the discharge shows intracellular gram-negative diplococci in leukocytes. Which one of the following should be used in the treatment of this patient?

1. Ceftriaxone
2. Ciprofloxacin
3. Procaine penicillin
4. Ceftriaxone plus doxycycline ✔
5. Doxycycline

INCORRECT ✖

The correct answer is 4.

This patient has gonococcal urethritis (GCU), which is caused by Neisseria gonorrhoeae. GCU is more common among homosexual men and those of the lower socioeconomic strata. Nongonococcal urethritis (NGU) on the other hand, is more commonly encountered in heterosexual males and those of higher socioeconomic class. NGU is twice as common as gonococcal urethritis; it is the most common sexually transmitted disease (STD) in men and

is usually due to Chlamydia trachomatis. However, Trichomonas vaginalis or herpes simplex virus (HSV) can also cause NGU. At one time, the standard treatment would have been penicillin **(Choice 3)**. However, because of increasing resistance, penicillin is no longer recommended for gonorrhea.
(Choice 1) and cefixime are drugs that inhibit cell wall synthesis and are not susceptible to β-lactase hydrolysis; therefore, they are recommended replacements for penicillin in the treatment of gonorrhea.
(Choice 2) The quinolones, ciprofloxacin and ofloxacin inhibit bacterial DNA gyrase and have a relatively broad spectrum of activity. They too are effective against gonorrhea. However, because chlamydial infections so often accompany gonococcal infections, the Centers for Disease Control (CDC) recommends that all patients with suspected or proved gonococcal urethritis also be treated as if they had chlamydial NGU.
(Choice 5) Although the quinolones have antichlamydial activity in vitro, they have not been recommended for clinical infections. C. trachomatis is susceptible to tetracyclines such as doxycycline, but strains of tetracycline-resistant N. gonorrhoeae have also become too common to recommend its use.
(Choice 4) Therefore, combined therapy, such as ceftriaxone and doxycycline, is required to treat both infections. Alternatively, because both organisms are still susceptible to the relatively new drug azithromycin, it can be used alone.

6. Question

1 points

A mother brings her 3-year-old son to the clinic with a history of recurrent blister formation after minor trauma. An interview with the mother reveals that this is a second marriage for both parents, and each parent brought two children into the union. The child in question is hers, and the stepfather is an alcoholic, a heavy smoker, and has temper tantrums. Which of the following is the most likely diagnosis?

1. Ehlers-Danlos syndrome
2. Systemic sclerosis
3. Epidermolysis bullosa ✔
4. Osteogenesis imperfecta
5. Child abuse

INCORRECT ✖

The correct answer is 3.

This patient has epidermolysis bullosa. This is an inherited condition that affects 1 in 50,000 individuals. The skin breaks down and forms blisters, usually after minor trauma. Even

stretching the skin can cause the lesion, and this is done to confirm the diagnosis. Treatment is symptomatic.

(Choice 1) Ehlers-Danlos syndrome, of which there are 11 types, is an inherited condition in which there is hyperelasticity of the skin and hypermobility of the joints. The skin does not break down. The incidence for all types collectively is approximately 1 in 5,000 births and is higher. The symptomatology varies depending on the type of disease and ranges from mild to life-threatening. The skin may be very thin, and the subjacent blood vessels may be seen. On the other hand, the skin may look like velvet and have extreme stretch ability ("rubber man" syndrome). Scars may look like cigarette paper, and hyperpigmentation over the joints is not uncommon. The pattern of inheritance varies with the type of disease, and in most forms, the biochemical defect has to do with collagen synthesis.

(Choice 2), also known as scleroderma, is a multisystem disorder of unknown etiology in which there is progressive fibrosis of the skin, blood vessels, and visceral organs in the chest and abdomen. The condition may predominantly involve the skin, in which there is rapid symmetric thickening of the skin of the proximal and distal extremities, face, and trunk. The tightness of the skin across the face may make a patient appear as if is constantly grinning. In other cases, the patient may have localized sclerosis-CREST syndrome, which is an acronym for calcinosis, Raynaud's phenomenon, esophageal dysfunction, sclerodactyly, and telangiectasia.

(Choice 4) also exists in multiple forms, having in common osteopenia (decreased bone mass). The simplest functional classification is: type I, mild; type II, lethal; and type III, moderately severe. Type I commonly is found over several generations in families and is characterized by a triad of blue sclera, brittle bones, and deafness. Joint laxity can also be a problem. Multiple fractures are most common before puberty and in association with premature osteoporosis in the elderly. Fractures are minimally displaced, and soft-tissue swelling is minimal. Deafness of the conductance type generally starts in the third or fourth decade. Penetrance of the blue sclera approaches 98%, whereas bone fractures and deafness are expressed less often. Some families with type I (type Ib) osteogenesis imperfecta also have dental abnormalities. Patients with type II osteogenesis imperfecta who do not die in utero or shortly after birth become progressively worse. Some of the subtypes of type III osteogenesis imperfecta do not have blue sclera. The diagnosis is clinical, and x-ray films reveal decreased bone density. This can be confirmed by photon or x-ray absorptiometry. Type I procollagen defects have been noted in most patients.

(Choice 5), although a possibility, is usually associated with fractures in different stages of healing and retinal hemorrhages seen on ophthalmoscopy. Fractures involving the posterior aspect of the ribs, spiral fractures of the extremities, and bucket-handle fractures of the metaphysis are pathognomonic of child abuse. Skin lesions include bruises; circular burns from cigarettes, especially in the gluteal region; and symmetric scalds involving the lower extremities and gluteal area as a result of immersion in hot water. Distinguishing osteogenesis imperfecta from child abuse is important.

7. Question **1 points**

A 26-year-old female flight attendant presents with a history of palpitations and difficulty breathing. She denies a history of allergies, long-term medications, or previous medical problems. She does not smoke but is a social drinker. Physical examination reveals a tall, medium-build female who appears anxious. Her vital signs are as follows: pulse, 88/min regular; blood pressure, 130/90 mm Hg; and, temperature, 37°C (98.6°F). Cyanosis, clubbing of the fingers and pedal edema are absent. Which of the following is the most likely diagnosis?

1. Aortic stenosis
2. Mitral stenosis
3. Aortic regurgitation
4. Mitral regurgitation ✔
5. Congestive cardiac failure

INCORRECT ✖

The correct answer is 4.

Mitral regurgitation can occur because of a tear of papillary muscle, in which the mitral valve prolapses. This is usually seen in young women between the ages of 14 and 30. Mitral valve prolapse is usually asymptomatic, but in a small number of cases can become symptomatic. This condition may actually encompass a wide spectrum of features ranging from a systolic click, murmur, and mild prolapse of the posterior leaflet of the mitral valve to severe mitral regurgitation due to rupture of the chorda tendineae with massive prolapse of both leaflets of the mitral valve. The condition usually develops slowly over a number of years. Mitral valve prolapse is the most common cause of isolated severe mitral regurgitation. Most often, patients have arrhythmias, dizziness, and syncope. Auscultation most often reveals a middle or late nonejection systolic click. This may or may not be associated with a high-pitched, late, crescendo–decrescendo murmur. Mitral valve prolapse is believed to be autosomal dominant. Causes include heritable connective tissue disorders, such as Marfan syndrome, osteogenesis imperfecta, and Ehlers-Danlos syndrome; however, in most cases the cause is unknown. The pathology is believed to be due to decreased production of type III collagen.
(Choice 1) is most commonly seen in females. The most common cause is rheumatic fever, and it may rarely be congenital. Cough, paroxysmal nocturnal dyspnea, dyspnea on exertion, and cardiac failure can occur as the stenosis gets more severe. Atrial fibrillation is commonly seen in patients with mitral stenosis. This could result in recurrent pulmonary emboli.
(Choice 2) can be congenital, may occur following rheumatic endocarditis, or may be due to idiopathic calcification usually noted in the elderly. Most cases of aortic stenosis occur in males. Physical examination reveals displacement of the apical pulse because of left ventricular hypertrophy, associated with a thrill, and an ejection systolic murmur conducted to the carotids. The volume of the pulse is decreased, and if the stenosis is severe, there may be evidence of left ventricular failure.

(Choice 3) is primarily seen in males, although aortic regurgitation with mitral regurgitation is more common in women. Most of the cases occur after rheumatic fever. Other causes of aortic regurgitation include syphilis, Marfan syndrome, and rheumatoid ankylosing spondylitis. Ventricular septal defects may be associated with aortic regurgitation. The most common and earliest complaint is an awareness of the heartbeat while lying down. Dyspnea, chest pains, and excessive sweating develop later. Physical examination reveals a displaced, forceful apex beat; diastolic thrill; and a high pitched, decrescendo diastolic murmur; and an ejection click. The pulse is bounding (Corrigan's pulse). Left ventricular failure could follow.
(Choice 5) usually follows cardiac or pulmonary disease. There is a history of dyspnea, fatigue, and swelling of the ankles. Cyanosis may be present. Auscultation will reveal basal rales. Congestive hepatomegaly, pleural effusion, and ascites may also be features. Pulsus alternans, if present, signifies severe heart failure. This is a condition in which a regular cardiac rhythm results in alternate strong and weak pulses. A third heart sound is usually seen in left ventricular failure or left ventricular overload. A fourth heart sound is often heard in normal individuals. It is also heard in patients with aortic stenosis, hypertension, cardiomyopathy, hyperthyroidism, and anemia. The last two are associated with hyperdynamic circulation.

8. Question

1 points

A 65-year-old male high school teacher who had a long history of smoking cigarettes and chronic obstructive airway disease saw his physician for increasing difficulty with breathing. Recently, he noticed that he could get some relief if he pursed his lips while exhaling. This caused a slight whistling sound, and his students had even nicknamed him "Mr. Whistler." He informed the physician that he had episodes of early morning cough with expectoration on some occasions, which was yellowish or greenish in color. He confessed that he did not like to go to see a doctor unnecessarily, but this time his wife forced him to do so since he seemed confused at times; this worried her, as she thought he was getting Alzheimer disease since his father had died from it. The physician's recommendation would have been which one of the following?

1. A course of corticosteroids
2. A course of corticosteroids and antibiotics
3. A course of antibiotics
4. Oxygen ✔
5. Donepezil

INCORRECT ✖

The correct answer is 4.
This patient has advanced chronic obstructive airway disease (COPD). His episodes of confusion are most likely manifestations of periods of hypoxia. Supplemental oxygen therapy is the mainstay of treatment in patients who have COPD and hypoxemia.
(Choice 1) alone would not abolish the hypoxemia.
(Choice 2) Corticosteroids and antibiotics are indicated in exacerbations of COPD. There is nothing in the history that he currently suffers from cough with expectoration.
(Choice 3) would certainly be indicated if he had an active chest infection, which he does not. His main problem is the advancing disease and hypoxia.
(Choice 5) is a centrally acting acetylcholine inhibitor used to treat Alzheimer disease. He does not have Alzheimer disease. In Alzheimer disease, there is a progressive loss of short-term memory and not episodic confusion. He could be at risk for it if there was a genetic predisposition, given that his father died from it.

9. Question

1 points

A patient with myasthenia gravis that has been well controlled with pyridostigmine for 2 years comes to the emergency department complaining of progressive muscle weakening during the last 24 hours. He has trouble swallowing and suffers from double vision. The patient has had flu-like symptoms for the past week. Which of the following is the most appropriate immediate course of action?

1. Increase the dose of pyridostigmine.
2. Replace pyridostigmine with physostigmine.
3. Give a small dose of edrophonium. ✔
4. Decrease the dose of pyridostigmine.
5. Administer succinylcholine.

INCORRECT ✖
The correct answer is 3.
The patient may be experiencing a cholinergic crisis from taking an overdose of pyridostigmine or a myasthenic crisis from not taking an adequate dose. Infections in myasthenic patients may alter drug dosage requirements, and because gastrointestinal (GI) upsets are common in "flu," the physician cannot reliably use changes in bowel activity to aid in diagnosis. To determine whether his crisis is due to too much or too little pyridostigmine, a small dose of edrophonium (usually 2 mg, 1 hour after the last oral dose of pyridostigmine) should be given. This will inhibit acetylcholine esterase and increase acetylcholine levels. It should be followed by careful observation to see whether muscle strength improves

(indicating an inadequate dose of pyridostigmine) or worsens (indicating an excessive dose). In the former case, the dose of pyridostigmine should be increased **(Choice 1)**. In the latter case, the worsening effect is quite brief, lasting only a few minutes. Subsequently, the dose of pyridostigmine should be decreased **(Choice 4)**. Equipment for intubation should be at hand should this be required.
(Choice 2) Physostigmine is a tertiary amine cholinesterase inhibitor that readily enters the central nervous system and the eyes. It is a specific antidote for tricyclic antidepressant and anticholinergic poisoning. It competitively blocks the hydrolysis of acetylcholine by cholinesterase, allowing acetylcholine to accumulate and counter the muscarinic effects of tricyclic overdose. In the case of the eye, it promotes contraction of the ciliary muscle, with resultant miosis and increased outflow of aqueous humor from the posterior chamber into the canal of Schlemm. The net effect is lowering intraocular pressure. Hence, it is used in open-angle glaucoma. It has no role in the treatment of myasthenia gravis.
(Choice 5) Neither is succinylcholine of any value in the treatment of myasthenia gravis. Succinylcholine is a depolarizing agent that causes neuromuscular blockade, with resultant skeletal muscle paralysis. It is an agonist at the nicotinic end-plate receptor.

10. Question

1 points

A 30-year-old Caucasian woman who claims to never have smoked presents with bilateral puffiness and swelling of the fingers with joint pains. Cold exposure and stress cause episodes of blanching or cyanosis of the fingers. She is not on any medications. The mechanism for this patient's disease is most likely the result of which one of the following?

1. Vasospasm and thickening of the digital arteries ✔
2. Hyperviscosity due to an increase in immunoglobulin M (IgM) antibodies
3. An immune complex vasculitis
4. Thrombosis of the digital vessels
5. An embolism to the digital vessels

INCORRECT ✖

The correct answer is 1.

Two forms of scleroderma exist, limited (in 80% of cases) and diffuse also known as systemic sclerosis (in 20%). The limited form is usually restricted to the hands and feet and includes CREST syndrome (characterized by calcinosis of the digits, Raynaud's phenomenon, esophageal motility dysfunction, sclerodactyly of the fingers, and telangiectasia over the digits and under the nails), and pulmonary hypertension. The limited form of the disease has a better prognosis than the diffuse one. Both systemic sclerosis and

localized scleroderma present with Raynaud's phenomenon in almost all patients, often antedating other manifestations of the disease by years. Cold temperatures and stress are stimuli that produce color changes of the fingers (sometimes toes), which first blanch, then become cyanotic, and then red. Vasospasm and thickened digital arteries are responsible for these changes. CREST syndrome is characterized by calcinosis of the digits, Raynaud's phenomenon, esophageal motility dysfunction, sclerodactyly of the fingers, and telangiectasia over the digits and under the nails; the anti-centromere antibody is positive in about 50% of cases.
Systemic sclerosis is a more generalized disorder of connective tissue, characterized by degenerative and inflammatory changes that result in the subsequent increase of collagen tissue deposition in various tissues. Tightening of the skin of the face and extremities is a universal finding. Esophageal motility problems, with dysphagia for solids and liquids, occur in 80% of patients. Other problems include arthritis (80%), renal involvement with concomitant thickening of the interlobular arterial intima followed by concentric onion skin hypertrophy during the healing stage (60%), pericardial effusions (20%–50%), pulmonary fibrosis with restrictive lung disease (35%), and subsequent pulmonary hypertension and renal crisis (15%). The antinuclear antibody test result is positive in 70%-90% of cases. The anti-Scl-70 antibody is specific for systemic sclerosis and is noted in 20%-33% of cases. D-Penicillamine may improve long-term survival, as it may improve skin sclerosis.
Cryoglobulinemia caused by proteins that precipitate in cold temperatures, cold agglutinins with immunoglobulin M (IgM) antibodies that clump red blood cells in the digital vessels **(Choice 2)**, and immune complexes causing vasculitis **(Choice 3)** are not present. Other causes of Raynaud's phenomenon are thromboangiitis obliterans (Buerger disease), which is an inflammatory vasculitis producing thrombosis of the digital vessels **(Choice 4)** in male smokers and in ergotamine poisoning. Embolism to digital vessels in the hand is uncommon **(Choice 5)**.

11. Question

1 points

A 62-year-old woman with a history of diabetes and hypertension presents to the emergency department with the right eye deviated outward and an obvious ptosis. She has a slight headache. The pupils are normal size. Which of the following is the most likely diagnosis?

1. Cavernous sinus thrombosis
2. Superior oblique palsy
3. Posterior cerebral artery aneurysm with third nerve impingement
4. Vasculopathic (non-compressive) third-nerve palsy ✔
5. Internuclear ophthalmoplegia

INCORRECT ✖

The correct answer is 4.

Vasculopathic third-nerve palsy due to third-nerve deficit is the correct diagnosis. This causes rotation outward from medial rectus weakness and ptosis from levator palpebrae weakness and is associated with a normal pupillary size.

(Choice 1) Cavernous sinus thrombosis, although possible, is less likely because it would generally involve other cranial nerves as well.

(Choice 2) A superior oblique palsy from fourth cranial nerve damage can be congenital, but acquired cases are usually caused by trauma. Isolated fourth-nerve damage causes upward deviation of the eye and inability of depression on adduction, and often first becomes apparent while descending the stairs.

(Choice 3) A compressive lesion, such as an aneurysm or a tumor, would compress the dorsomedial portion of the third nerve and cause a dilated, unreactive pupil. This distinction is important because a third nerve lesion that spares the pupil is generally non-emergent, whereas lesions that involve the pupil are best considered medical emergencies.

(Choice 5) is due to interruption of the signal from the sixth-nerve nucleus contralateral to the medial rectus nucleus of the third cranial nerve that is conveyed via the medial longitudinal fasciculus. This results in the inability of the medial rectus to contract in a synchronous manner when the lateral rectus does, resulting in diplopia on conjugate lateral gaze. The condition could result from vascular or demyelinating disease.

12. Question

1 points

A worried father brings his 17-year-old daughter to the emergency department in Stockton, California, at 11:15 PM. He informs the triage nurse that his daughter has been experiencing headaches for about 2 days, and today she has been extremely fatigued. He is particularly concerned because she rarely experiences headaches and has always been very active. When seen by the doctor, the daughter tries to make light of her condition. She blames the drowsiness on taking too many acetaminophen/codeine pills prescribed several weeks ago by her dentist. She admits, however, that she took the pills because she has the “mother of all headaches”: she does not recall ever having one of such intensity. She further suggests that her fatigue may also be a consequence of the fact that she has been losing sleep because her headaches wake her up, being particularly intense at night. When asked if her neck is stiff, she gives an ambiguous answer. She is slightly nauseous, but has not vomited. She has never had any major illnesses, has been active in high school athletics, and does not know of anyone sick with whom she has been in contact.

Physical examination reveals the following: temperature, 40°C (100°F): blood pressure, 140/70 mm Hg: pulse, 120/min and regular. The cardiovascular, respiratory, gastrointestinal, and genitourinary systems are all normal. The central nervous system examination, including funduscopy, seems normal. She is oriented with respect to time and space: however, she is unduly sensitive to bright lights. There is a very slight resistance to the forward flexion of the neck. Neuromuscular tone and reflexes are normal.

The laboratory profile reveals the following: serum white blood cell (WBC) count of 10,500 cells/mm^3 (normal 4,800–10,800 cells/mm^3), erythrocyte sedimentation rate (ESR) of 20 mm/h (normal female <15 mm/h): electrolyte profile blood sugar level, serum amylase level, and chest x-ray film are all within normal limits.

On the basis of these data, a lumbar puncture is performed. The following results are obtained: cell count, 28 cells/mm^3, 95% mononuclear lymphocytes (normal is 0–5 cells/mm^3, lymphocytes): glucose, 48 mg/dL (normal is 48–85 mg/dL): protein, 85 mg/dL (normal is 15-45 mg/dL): and chloride, 120 mEq/L (normal is 118–132 mEq/L). Which of the following is the most likely diagnosis?

1. Bacterial meningitis
2. Cryptococcal meningitis
3. Coccidia immitis meningitis
4. Aseptic meningitis ✔
5. Actinomyces meningitis

INCORRECT ✖

The correct answer is 4.

Upon even slight suspicion of meningitis, it is wise to perform a spinal tap, provided of course that there is no evidence of raised intracranial pressure. Features common to most cases of meningitis include headache (often the predominant presenting symptom, and unlike most headaches, it is generally more severe when lying down and resting); photophobia; vomiting; giddiness; fever; and stiffness of the neck, spinal muscles, and hamstrings. This patient presents with sufficient symptoms to suggest that she has meningitis. The analysis of the spinal fluid indicates that she suffers from aseptic meningitis, most typically induced by a viral infection. In viral meningitis, at most there are only few more white blood cells than normal, and as in a normal sample, these primarily are mononuclear lymphocytes. In aseptic meningitis, the spinal fluid glucose level is usually in the low-normal range, and protein levels tend to be elevated, as in the case described.

(Choice 1) Although the patient presented with sufficient symptoms to diagnose a case of meningitis, many symptoms were marginal, suggesting that it was not a fulminating case, as is often seen in bacterial meningitis. Bacterial meningitis is characterized by a greater number of leukocytes (from 200 to 20,000), which are primarily polymorphonuclear neutrophils. The spinal fluid glucose level is generally significantly lower than normal, and protein levels are elevated to a greater degree than in aseptic meningitis (often above 100 mg/mL).

(Choice 2) is almost always an opportunistic infection in an immunocompromised host. The patient's history strongly suggests that this is not a relevant factor. Although human immunodeficiency virus (HIV) and herpes simplex virus type 2 infections may cause chronic viral meningitis, her history tends to rule these out as causative agents.

(Choice 3) Coccidia immitis meningitis, although relatively rare, might also be suspected because the patient comes from the San Joaquin Valley in California. However, to make this diagnosis, the glucose level in the spinal fluid should be well below normal. Other pointers to it in the cerebrospinal fluid would be increased cell count, lymphocytosis, the presence of complement-fixing antibodies, and, a positive culture in approximately 30% of cases.
(Choice 5) Actinomyces meningitis, although uncommon, might be suspected in this case because the patient had recent dental work, a significant risk factor for infection by this anaerobic class of bacteria. However, as discussed above, the laboratory results are not characteristic of a bacterial infection.
It is critically important to distinguish between bacterial and viral meningitis. If bacterial meningitis is not properly managed, the consequences are severe, often resulting in death, whereas viral meningitis is generally self-limited. Viral meningitis caused by herpes or human immunodeficiency virus (HIV) is a major exception to this rule.

13. Question

1 points

A 16-year-old male distance runner presents with complaints of worsening athletic performance and increasing cough and sputum production after running. He is very concerned because the state track meet is only 2 weeks away. Findings of the physical examination are normal. Which of the following is the most appropriate next step in the management of this patient?

1. Prescribe a β₂-agonist inhaler to be used 5 minutes before activity. ✔
2. Prescribe theophylline to be taken orally.
3. Prescribe a cromolyn sodium inhaler to be used 15 minutes before activity.
4. Prescribe erythromycin to be taken orally for 10 days.
5. Explain that he has asthma and should refrain from strenuous activities from now on.

INCORRECT ✖

The correct answer is 1.

The athlete is suffering from exercise-induced asthma. Common symptoms include postexercise cough, dyspnea out of proportion to the level of exertion, poorer performance than expected, wheezing, chest tightness, and sputum production. The treatment of choice is β_2-agonists, usually two puffs to be inhaled 5 minutes prior to exercise.
(Choice 2) is usually indicated for rapid relief of symptoms in acute asthma or as a prophylaxis for bronchial asthma and bronchospasm induced by chronic bronchitis and emphysema. It has potentially serious side effects, including seizures, hypotension, cardiac arrhythmias, and even respiratory arrest.

(Choice 3) Cromolyn sodium is a second-line agent. It is given in the form of two sprays, 1 hour prior to exercise. It is used in combination with β_2-agonists in the treatment of severe recurrent bronchial asthma. Other uses include the prevention of allergic rhinitis and allergic ocular disorders. A rare but serious complication is angioedema.
(Choice 4) Erythromycin should not be part of the treatment plan because there are no signs of an infection.
(Choice 5) Lifelong abstinence from strenuous activity would be a gross overreaction.

14. Question

1 points

A 71-inch tall (1.8 m), 57-year-old man weighs 208 pounds (94.3 kg), feels healthy, and wants to take out life insurance. Consequently, he is subjected to a physical examination with subsequent laboratory analyses. The following data are obtained: blood pressure, 155/84: fasting blood glucose, 115 mg/dL: total cholesterol, 265 mg/dL: triglycerides, 157 mg/dL: high-density lipoprotein (HDL), 39 mg/dL: low-density lipoprotein (LDL), 125 mg/dL. Which one of the following is also most likely true regarding this man?

1. His plasminogen activator inhibitor-1 (PAI-1) is lower than normal.
2. His insulin levels are higher than normal. ✔
3. Glucose uptake into his muscles is inhibited.
4. Glucose uptake into his adipose tissue is inhibited.
5. His uric acid level is lower than normal.

INCORRECT ✖

The correct answer is 2.

The metabolic syndrome (once called syndrome X, insulin resistance syndrome, or the deadly quartet) is a pre-diabetic condition in which there is hyperglycemia (but not to the level that diabetes can be diagnosed), hypertension, dyslipidemia, and hyperinsulinemia. Three of the parameters of this "deadly quartet" are attributed to this patient in the clinical vignette; these are:

- Hyperglycemia. The normal fasting serum glucose value is defined as less than 110 mg/dL; thus, his value of 115 mg/dL is hyperglycemic. Such values that fall between 110 and 125 mg/dL are characteristic of impaired glucose tolerance, generally indicate prediabetes, and probably should be treated, at least by appropriate dietary changes. Frank diabetes is indicated by repeated fasting values of greater than 125 mg/dL.
- Hypertension. The table illustrated below summarizes the characterization of blood pressure values. As demonstrated in the following table, the patient's blood pressure of 155/84 mm Hg is classified being stage 1 hypertensive. This is a second member of

the “deadly quartet” and is also a risk factor for eventual congestive heart failure, as well as for stroke, myocardial infarcts, and other long-term anomalies, thus it should be treated immediately.

Classification	Systolic Pressure (mm Hg)	Diastolic Pressure (mm Hg)
Normal	90-119	60-79
Prehypertension	120-139	80-89
Stage 1	140-159	90-99
Stage 2	≥ 160	≥ 100
Isolated systolic hypertension	≥ 140	< 90

- Dyslipidemia. The following table summarizes the desirable levels for the various lipoproteins. Clearly, his total cholesterol value of 265 mg/dL; his low-density lipoprotein (LDL) value of 125 mg/dL, and his triglyceride value of 157 mg/dL are above acceptable normal values. Conversely, his good cholesterol, the high-density lipoprotein (HDL) value of 39 mg/dL, is way below that recommended. Clearly, he also has dyslipidemia—a third member of the “deadly quartet.”

Lipoproteins (Measured after an overnight fast, concentrations expressed as mg/dL)

	Total Cholesterol	LDL-Cholesterol	HDL-Cholesterol	Triglycerides
Desirable (Optimal)	<200	<100	≥ 60	< 150
Near optimal/ above optimal	N/A	100-129	N/A	N/A
Borderline high	200-239	130-159	N/A	150-199
High	≥ 240	160-189	N/A	200-499
Very high	≥ 190	N/A	N/A	≥ 500
Undesirable	N/A	N/A	<40	N/A

In so much as this man has been demonstrated to have three of the four characteristics that define metabolic syndrome, it is highly probable he also has the fourth one, namely:

- Hyperinsulinemia. Also, this man's height and weight correspond to a body mass index (BMI) of 29 kg/m2, which is classified as overweight, borderline obese. Obesity is anything above 30 kg/m2; it is an additional important factor in the development of the syndrome, but is of itself not an intrinsic component, as shown by the fact that many obese individuals do not develop the syndrome.

The complex of abnormalities making up the syndrome often precedes type 2 diabetes, sometimes as much as by 9–10 years, and during this time some of the vascular complications, such as retinopathy and nephropathy, may begin. Thus, the condition should be treated before frank diabetes manifests. The first line of treatment is usually diet and exercise. As little as a 15-lb weight loss can make remarkable changes and even prevent the development of diabetes.

(Choice 1) Although the four factors described are those usually associated with the syndrome, there are others. One is an increase in plasminogen activator inhibitor-1 (PAI-1) (it is not lower than normal). This inhibits fibrinolysis, and along with hypertension and dyslipidemia, further promotes development of coronary and other artery disease.

(Choices 3 & 4) Although muscle and adipose tissues become resistant to insulin, glucose uptake into muscle or adipose cells is not decreased, because the resistance to insulin is compensated for by an increase in its concentration, thus leading to a minimal hyperglycemia. That uptake of glucose into adipose cells is not inhibited is clearly demonstrated by the fact that pre–type 2 diabetics gain weight. Not all cells become insulin resistant; thus, the hyperinsulinemia causes a metabolic imbalance that is related to the symptoms associated with the syndrome. This state of affairs continues until the ability of the pancreas to compensate becomes limited; when it does, the circulating glucose levels increase until frank diabetes occurs.

(Choice 5) An increase in serum uric acid levels, not a decrease, also occurs in this pre-diabetic state.

15. Question

1 points

A 55-year-old Caucasian man visits his family physician because he is concerned that he may have a "heart problem." The patient states that he has had twinges of chest pain when he walks up the stairs or runs for a short distance. The pain lasts for a few minutes, and he becomes winded as well. He smokes approximately three or four cigarettes a day, and had been doing so for several years. His mother died at the age of 72, and she had diabetes mellitus for years. Upon examination, the physician noted normal vital signs, but he also observed that the patient had reddish yellow lesions over the gluteal area. This physical finding would most likely be due to which one of the following?

1. A markedly elevated very-low-density lipoprotein level ✔
2. A markedly elevated high-density lipoprotein level
3. A markedly elevated free triglyceride level

4. A markedly elevated free cholesterol level
5. Xanthomatosis
6. Xanthelasma
7. Markedly elevated low-density lipoprotein levels

INCORRECT ✖

The correct answer is 1.

This patient has a history suggestive of angina pectoris and has risk factors for this, including being a smoker, a family history of diabetes mellitus, and now, a hyperlipidemia demonstrated by xanthomas (the reddish yellow lesions) over the gluteal area. These papules are filled with lipid that can erupt (eruptive xanthoma). They may be located under the skin or even on some tendons. They may be present in normal populations but generally are increased in patients with diabetes mellitus and lipid disorders such as hypertriglyceridemia, hypercholesterolemia, lipoprotein lipase deficiency, and abetalipoproteinemia. They signify a markedly elevated very-low-density lipoprotein (VLDL) level.

(Choices 2 & 3) An elevated high-density lipoprotein (HDL) level is not a risk factor for hyperlipidemia; in contrast this, the "good cholesterol" fraction, is beneficial in keeping the other lipoprotein levels in check. Although an elevated triglyceride level greater than 1,000 mg/dL is usually seen in patients with eruptive xanthomas, they are mainly increased due to an elevated VLDL level, not to free triglyceride. Most of the serum triglyceride is carried in the VLDL fraction.

(Choice 4) The predominant lipids carried in the blood are cholesterol and triglycerides; both are carried on specific "apoproteins," which, when complexed with their appropriate lipoidal component, form the various lipoproteins. They are not carried as the free lipids.

(Choice 5) Separated xanthomata such as these should be distinguished from xanthomatosis, a generalized increase in xanthomata that may be seen in malignancies such as lymphomas and multiple myeloma or in familial hypercholesterolemia syndrome and Wolman disease. (Wolman disease is an autosomal recessive cholesterol ester storage disease that is due to a defect in lysosomal sterol esterase. It results in the accumulation of triglycerides and cholesterol esters. It usually occurs in consanguineous cohorts. These patients have hepatomegaly, adrenal calcification, steatorrhea, and anemia in addition to xanthomatosis).

(Choice 6) on the other hand are yellowish that which contain lipid-laden histiocytes that surround blood vessels. They are usually located over the medial aspect of the eyelid. They are not due to hyperlipidemia in the elderly, but they certainly are in younger people.

(Choice 7) Lipoproteins are classified according to their density as originally determined by ultracentrifugation; the more lipid, the less dense it is. Markedly elevated low-density lipoprotein (LDL) levels are associated with tendinous xanthomata; this represents a genetic triglyceridemia. Such a dyslipidemia, which is inherited in a classic Mendelian pattern, is called a primary dyslipidemia, as distinguished from the more common secondary dyslipidemias that may be influenced by genetics but are primarily caused by life style. The xanthomata due to tendinous xanthomata are deposited in certain tendons such as the

Achilles, quadriceps, and extensor tendons of the hand. In such cases, serum triglyceride levels may be above 2,000 mg/dL (extremely high levels) and cream-colored retinal blood vessels may be seen in the fundus, a condition known as lipemia retinalis.

16. Question **1 points**

A 62-year-old, obese Australian man was seen in the emergency room. He was sweating profusely and was also nauseous and complaining of an acute crushing substernal chest pain. He also has had a prior history of recurrent attacks of angina, was on medication for diabetes mellitus, and smoked one pack of cigarettes per day. The most likely immediate cause for his presenting problem is which one of the following?

1. Cigarette smoking
2. Atherosclerosis
3. A dislodged plaque ✔
4. Increased weight
5. Narrowing and closure of a coronary artery or arteries

INCORRECT ✖

The correct answer is 3.

This patient is demonstrating the classical signs of a myocardial infarct. A ruptured atherosclerotic plaque followed by thrombosis is believed to be responsible for most myocardial infarctions (MI). The rupture is believed to be triggered by inflammation and metalloproteinase activity. Matrix metalloproteinases are a family of enzymes that remodel the extracellular matrix of the cardiac blood vessels. On the positive side, they may act to help stabilize rupture-prone plaques; conversely, the imbalanced action of some specific isoforms may promote failure of the remodeling process, causing the fibrous cap covering the lipid core to break down. This disperses lipoidal material distally, leading to vascular occlusion and subsequent infarction of the myocardium and perhaps even causing sudden death. Factors that increase the vulnerability of plaques to rupture include greater lipid content and an increase in the number of macrophages resulting in a thin fibrous seal, which can give way easily.

(Choice 1) is incorrect. Cigarette smoking is the most important preventable risk factor for cardiovascular disease. However, it is not the immediate cause of MI; it is believed that smoking contributes to the atherosclerotic process and plaque instability, in part by increasing the adherence of macrophages to the vessel wall and inducing the release of proteolytic enzymes (metalloprotein isoforms?). Approximately 20% of women and 25% of

men smoke in the Australia. Those who quit smoking will have a 50% drop in the risk for cardiovascular disease after just 1 year. Hence, it is important to encourage and help patients to quit smoking altogether.
(Choice 2) is incorrect. Atherosclerosis is not an immediate cause for a myocardial infarct. Atherosclerosis results from hyperlipidemia, which is a risk factor for coronary artery disease. Initially, fat is deposited in the subendothelial space. This is known as a fatty streak. Macrophages enter this area and take up the lipids, giving them the appearance of foam cells. Further progression leads to the migration of myocytes. If there is no further accumulation of lipids and migration of macrophages, fibrosis is followed by calcification. The vessel wall undergoes remodeling at the cost of a decreased lumen and impaired blood flow, which could result in myocardial ischemia (angina pectoris).
(Choice 4) is incorrect. Obesity is a risk factor for coronary artery disease and not the cause for the MI that has occurred.
(Choice 5) is incorrect. Narrowing and closure of a coronary artery or arteries is gradual, and is not an acute event.

17. Question **1 points**

A 62-year-old man who had a myocardial infarction (MI) is taking an 81 mg aspirin tablet daily, plus a maintenance dose of warfarin, which is adjusted to give a prothrombin time (PT) of 11–15 seconds. While on vacation, he starts using over-the-counter cimetidine for acid indigestion. A day or two before returning home, he develops a urinary tract infection for which trimethoprim-sulfamethoxazole is prescribed by a local physician. When he returns home, his PT is 27 seconds. Which of the following statements about this situation is most accurate?

1. The dose of warfarin should be increased to ensure adequate anticoagulation.
2. The antibiotics have increased the activity of liver enzymes that metabolize warfarin.
3. The antiplatelet action of aspirin has blocked the effects of warfarin.
4. Cimetidine has inhibited the hepatic metabolism of warfarin. ✔
5. Warfarin should not have been prescribed because it is not used prophylactically after an MI.

INCORRECT ✖
The correct answer is 4.
The anticoagulant drug warfarin has been implicated in numerous drug interaction scenarios. Warfarin is documented to exert prophylactic actions after a myocardial infarction (MI) {**(Choice 5)** is incorrect}, and the dosage regimen was appropriately adjusted in this patient **(Choice 1)** to result in an approximate 50% increase in prothrombin time (PT) (normal range

is 11–15 seconds). The further increase in PT described is likely to result in a bleeding episode, and reflects increased activity of warfarin at the established dose. The histamine (H2)-blocking drug cimetidine is known to be a potent inhibitor of liver drug-metabolizing enzymes, including those forms of cytochrome P450 that are responsible for the metabolic inactivation of warfarin. Thus, concomitant administration of cimetidine is anticipated to increase PT; by inhibiting the hepatic metabolism of warfarin, it increases its circulating concentration. Other causes that can prolong PT include inadequate vitamin K in the diet; inadequate absorption, as in Crohn disease, and severe hepatic dysfunction.
(Choice 2) Trimethoprim-sulfamethoxazole does not increase the activity of hepatic drug-metabolizing enzymes (rifampin does) and would result in a decreased PT if warfarin metabolism was increased.
(Choice 3) The antiplatelet action of aspirin does not antagonize the effects of warfarin and may lead to an increased bleeding tendency. Salicylates and sulfonamides may also increase PT by competition with warfarin for plasma protein binding, leading to an increase in the plasma-free fraction of warfarin. Note that many drugs capable of inducing the formation of liver drug-metabolizing enzymes (e.g., barbiturates, carbamazepine, and phenytoin) will decrease PT in patients on warfarin.

18. Question

1 points

An 80-year-old man with a history of coronary artery disease (CAD) and prostate cancer presents with weakness of both legs that has lasted for a week. Starting yesterday, he developed pain in his lower abdomen and had great difficulty emptying his bladder. Examination shows that he has sensory loss from T10 downward and is barely able to move his legs. Which one of the following is the proper treatment strategy?

1. Admit the patient and schedule a magnetic resonance imaging (MRI) study the next day.
2. Order an emergency MRI study after administering an intravenous (IV) bolus of steroids. ✔
3. Schedule plasmapheresis for Guillain-Barré syndrome.
4. Order electromyography (EMG).
5. Order radiation therapy over lumbar and sacral levels.

INCORRECT ✖

The correct answer is 2.

This patient has neoplastic metastatic epidural cord compression that has arisen from carcinoma of the prostate. The compression has worsened over the past 24 hours but began

a week earlier with weakness of his legs. The initial management would be to administer a bolus dose of dexamethasone intravenously (IV) and then perform a magnetic resonance imagining (MRI) study of the spine with and without gadolinium contrast. The sensitivity of this test is greater than 90%. Thereafter, IV administration of dexamethasone should be continued every 6 hours to combat spinal cord edema. This is a neurosurgical emergency, and immediate decompression should be carried out to salvage neurologic function. The development of urinary bladder problems makes this an even greater reason to act as quickly as possible. Thereafter, the patient should be referred for radiotherapy of the appropriate region.

(Choices 1 & 3) Waiting for 24 hours before doing an MRI would only jeopardize neurologic recovery. The patient does not have Guillain-Barré syndrome. This is usually seen in a younger individual, in whom there is a prior history of upper respiratory tract or gastrointestinal infection, following which ascending motor paralysis results. There is no sensory or urinary bladder involvement. Hence, plasmapheresis, a treatment for Guillain-Barré syndrome, is not indicated.

(Choice 4) Ordering electromyography would not contribute to diagnosis or management. It would only confirm what is known clinically—that the patient has weakness of his legs due to motor involvement. Even then, abnormalities will be noted approximately 3 weeks after the onset of weakness.

(Choice 5) Sending him for radiotherapy of the lumbar and sacral spine is incorrect. Radiotherapy usually follows surgical decompression and has to be done along the extent of the tumor, as delineated by the MRI. In some cases, however, surgical decompression is not done, and radiotherapy is carried out under steroid cover following a radiologic diagnosis.

19. Question

1 points

A 24-year-old man was admitted to the hospital with a history of fatigue and confusion. A few days previously, he developed an infection in his foot, which has become worse. The patient is a diabetic who takes insulin. His temperature is 38.5°C (101.3°F): pulse, 96/min regular: respirations 20/min: and blood pressure, 90/60 mm Hg. His tongue is dry, and he has poor skin turgor. Apart from confusion, his neurologic examination is non-focal. Cardiovascular examination is normal except for a sinus tachycardia. Respiratory system examination is unremarkable with the exception of a fruity odor in his breath. He has diffuse abdominal tenderness, but no masses or organomegaly are noted. Bowel sounds are present. He has cellulitis of his right leg, as a result of the infection in his foot. Serum glucose level is 700 mg/dL. The appropriate diagnosis was made, and he received intravenous fluids, antibiotics, and human insulin. During therapy, the patient develops respiratory paralysis requiring intubation and assisted ventilation. Which one of the following is the cause for the patient's respiratory failure?

1. An anaphylactic reaction due to insulin
2. Glucose toxicity

3. Ketoacidosis
4. Hypophosphatemia ✔
5. Hyperkalemia
6. Bacteremia

INCORRECT ✖

The correct answer is 4.

This patient has diabetic ketoacidosis (DKA), most likely due to the increased insulin requirement generated by the infection, a common problem. In DKA, glucosuria results in the loss of significant amounts of sodium, potassium, and phosphorus in the urine. When insulin is used in the treatment of DKA, phosphate is normally transported along with glucose into muscle and adipose cells; this permits phosphorylation of glucose, allowing further metabolism. Insulin treatment also enhances glycolysis, which further depletes the already decreased concentration of phosphate in the blood, leading to hypophosphatemia. Depletion of phosphate results in a corresponding decrease in adenosine triphosphate (ATP) within the muscle, leading to paralysis of the respiratory muscles and respiratory failure in the patient. This sequence of events is the rationale for providing phosphate supplementation in the treatment of DKA when phosphate levels begin to decline during insulin therapy.

(Choice 1) Human insulin does not produce anaphylactic reactions.

(Choice 2) refers to the effect of hyperglycemia in reducing the sensitivity of tissues to insulin therapy in both type 1 and type 2 diabetes mellitus.

(Choice 3) is not a cause of muscle weakness resulting in respiratory problems.

(Choice 5) Although hyperkalemia is commonly seen in the setting of DKA, it is not due to an excess of potassium stores, but is the result of a transcellular shift of potassium out of cells as excess hydrogen ions in ketoacidosis are buffered intracellularly. This transcellular shift often disguises the marked deficits in total body potassium that these patients have because of urinary potassium loss due to the osmotic effect of glucosuria. Severe hypokalemia can also cause muscle paralysis by preventing muscle repolarization. Therefore, potassium supplementation is extremely important in the treatment of DKA and can be given as potassium phosphate rather than potassium chloride.

(Choice 6) is a feature of septic shock, in which the cardiovascular system is the target. Endotoxins, especially those due to gram-negative sepsis, lead to hypotension, tachycardia, and tachypnea but not to paralysis of the respiratory muscles.

20. Question **1 points**

A 55-year-old man came to see his physician for recurring attacks of headache. He stated that the headaches were mainly in the occipital area, and occurred at different times. He worked as a manager in a local office supply store and would get an exacerbation of headaches when he was

under stress. There was no nausea or vomiting. At times, he would become dizzy and would have to sit down. A few hours ago, he experienced left-sided chest pains that lasted about 2 minutes, and then went away. He denied head trauma, difficulty in breathing, and swelling of his legs. Over the past few months, he had to get up at night to urinate, and this had been getting worse. He did not smoke, used wine on social occasions, and had no family history of medical disease.

Upon examination, the physician found him to be a well-built Caucasian male, who was not in distress, had no pallor or cyanosis. His blood pressure was 150/100 mm Hg and was the same when repeated later. The pulse was 80/min regular, respirations 16/min, and his temperature was 37°C (98.6°F). He weighed 75 kilograms (165.3 pounds). Funduscopy revealed some arteriolar narrowing with A-V nipping. There were no hemorrhages or exudates, and the disc margins were sharp. There were no carotid bruits. The second heart sound was loud. There were no murmurs, gallops, or rubs. The chest was clear to auscultation bilaterally, and examination of the abdomen and extremities was normal. No peripheral edema was noted. Which one of the following medications was prescribed by the physician?

1. Atenolol
2. Furosemide
3. Hydrochlorothiazide
4. Diltiazem
5. Doxazosin ✔

INCORRECT ✖

The correct answer is 5.

This patient has two problems: hypertension and prostatic hypertrophy (which most often is benign). The latter diagnosis is based on the history of frequency of urination at night. Patients with both prostatic hypertrophy and hypertension are best treated with an α-1 selective antagonist such as doxazosin. This medication relaxes smooth muscles in the prostate, enabling better egress of urine, as well as those in the arterioles, thus lowering blood pressure. The half-life of doxazosin is about 24 hours. There are several α-1 selective antagonists. Prazosin relaxes the smooth muscles not only in the prostate, but in the arterioles and venules as well, thus enabling efficacious treatment for both conditions. The drawback is that, when taken orally, only 50% of the drug is utilized, shortening its half-life to approximately 3 hours. Another medication, tamsulosin, has a far greater effect on prostatic smooth muscle than it does on arterioles and hence has very little effect in lowering blood pressure. An alternative to doxazosin is terazosin, which also is efficacious in treating both benign prostatic hypertrophy and hypertension. However, terazosin has a half-life of slightly less than 12 hours.

(Choice 1) is a β blocker. It is utilized in the treatment of hypertension associated with angina and supraventricular tachycardia. In patients with angina, β blockers decrease oxygen demand by the myocardium. In patients with hypertension and supraventricular

tachycardia, β blockers prolong the refractory period in the AV node thereby delaying AV conduction.
(Choice 2) is a loop diuretic that is very useful in patients with congestive cardiac failure and/or peripheral edema. Although loop diuretics have been used in patients with mild to moderate hypertension, thiazide diuretics are usually the first choice in treating early hypertension. Given this patient's urinary outflow problems, a loop diuretic could lead to acute urinary retention due to outflow obstruction.
(Choice 3) is a thiazide diuretic that is usually given initially in the treatment of mild hypertension and as an adjunct for higher grades. It probably acts by inducing arteriolar dilatation. Once again, administering a diuretic to a patient who has problems with urination due to prostatic hypertrophy could lead to acute urinary retention due to outflow obstruction.
(Choice 4) is a calcium channel blocker. Other calcium channel blockers include nifedipine and verapamil. Although calcium channel blockers will lower the blood pressure, they will not relax prostatic smooth muscle. They relax the smooth muscles in arterioles and arteries, causing blood pressure to drop, thus making them useful for managing hypertension. They also delay conduction in the AV node, slowing the ventricular rate in patients with atrial fibrillation and reversing supraventricular tachycardia.

21. Question

1 points

A 16-year-old boy tells his gym instructor that he just isn't strong enough to do more than one push-up, and he isn't able to run a lap without being left breathless. The instructor suspects malingering but nonetheless sends him to the school physician for evaluation. Physical examination reveals a tall, gangly young man who is 5 ft 10 in (1.8 m) tall and weighs 155 lb (70.3 kg). His has a strikingly narrow face, an arm span of 6 ft 4 in (1.9 m), long legs, long thin fingers, pectus excavatum, and is myopic. His heart sounds reveal a pansystolic murmur near the apex of the atrium, with a prominent third heart sound. Which one of the following connective tissue components is most likely abnormal in this young man?

1. Fibrillin-1 ✔
2. Keratin 5 or 14
3. Type IV collagen
4. Type I collagen
5. Type XI collagen
6. Fibroblast growth factor receptor

INCORRECT ✖
The correct answer is 1.

The features described in the clinical vignette suggest that this boy has Marfan syndrome, a trait that is inherited as an autosomal dominant mutation in the fibrillin-1 gene and results in an aberrant fibrillin-1 protein. Marfan's syndrome is one of the most common connective tissue disorders, with an incidence of about 1 in 5,000 births, and about 25% of these cases are due to new mutations. Fibrillin-1 is a major constituent in the elastic fibrillin microfilaments that provide both support and elasticity to connective tissue throughout the body. Persons with Marfan syndrome may show a wide range of symptoms. Typically, they are tall, with abnormally long arms (arm span is greater than height), long legs and fingers (arachnodactyly), and a rather long thin face. (Many believe that Abraham Lincoln expressed the typical phenotype.) In addition to this typical phenotype, affected individuals may show a wide variety of other symptoms, some of which lead to physical weakness and lack of stamina, as in the case described. These symptoms may include mitral valve prolapse, aortic root dilation, pectus excavation, scoliosis, joint dislocations, pneumothorax (due to the collapse of a lung), and ectopic lentis. Mitral valve prolapse is the most common symptom (85% of cases); it may eventually contribute to early heart failure and is likely responsible for the unusual heart sounds heard in the patient described. Although heart failure may be responsible for the early demise of Marfan patients, aortic root dilation resulting in eventual dissection is the most common fatal consequence of Marfan syndrome. Prophylactic administration of a β blocker to slow the heart rate and lower blood pressure is used to help delay expansions of the aorta, and expansion is screened for by annual or even biannual echocardiograms. Once the aortic diameter expands beyond a certain critical diameter, prophylactic surgery can be performed. Similarly, the mitral valve can be surgically replaced if needed. As a consequence, life expectancy of treated Marfan patients is now similar to that of the general population. The major reason for the great variation in symptoms among Marfan patients is that, at the molecular level, Marfan syndrome is many diseases. The fibril-l gene is large, with 65 exons, and a l997 study found 85 different mutations among 94 unrelated patients. To add further variety to the mix, even in a given family there can be major differences in the degree to which different tissues are affected, presumably because of the nature of other structural connective tissue proteins.

(Choice 2) Epidermolysis bullosa (EB) is a constellation of conditions resulting in skin that blisters with minimal trauma. EB is relatively rare; the reported incidence varies from 1 case per 10^6 births in the United States to 54 cases per 10^6 births in Norway. On the physiologic level, the common feature of the various forms of EB is a weak connection between the upper and deeper layers of the skin due to aberrant supportive proteins. The worst cases result in death during infancy due to sepsis caused by bacterial invasion. Three major types are recognized: EB simplex (92% of cases), junctional EB (1%), and dystrophic EB (5%); the remaining 2% of cases are unclassified. EB simplex is due to mutations in either keratin 5 or 14 proteins that form intermediate filaments in basal keratinocytes. A deficiency of, or defects in, these proteins make these cells prone to cytolysis.

(Choice 3) Alport syndrome causes inherited kidney disease coupled to extrarenal complications, including sensorial deafness and eye abnormalities. It is due to mutations in one of the several genes coding for type IV collagen. Type IV collagen is the major structural component of basement membranes, where it provides a framework for the binding of other basement membrane components and is a substratum for cells. Type IV collagen has the typical collagen triple-stranded structure, and the individual strands are coded for by one or more of six different genes, COL4A1 through COL4A6. About 85% of the cases of Alport

syndrome are due to mutations in COL4A5 located on the X-chromosome. Males with mutations in this gene present with hematuria in infancy, which then progresses to uremic syndrome and end-stage renal disease by the second or third decade. Females are also affected, causing the disease to be classified as X-linked dominant; however, the course of the disease is less severe, and they often die at a normal age without developing end-stage renal disease. COL4A6 is also located on the X-chromosome, but mutations are less common and are associated with leiomyomatosis in epidermal cells. COL4A3 and COL4A4 are located on chromosome 2, and mutations in these genes cause an autosomal recessive form of Alport syndrome. COL4A1 and COL4A2 are located on chromosome l3; mutations in these genes cause less than l% of cases of Alport syndrome, and these are inherited as autosomal dominant traits.

(Choice 4) Type I collagen is composed of two α1 and one α2 peptides wound in the typical triple-stranded helix. It is the most abundant of the collagens; it provides tensile strength to bone and tendons and also contributes to a lesser degree in other tissues. Any of a number of mutations in either COL1A1 or COL1A2 causes osteogenesis imperfecta, a heterogeneous group of conditions generally clinically characterized by easily broken bones, loose and easily torn tendons, and in most cases (about 98%), blue sclera caused by a thin translucent cornea. Although at a molecular level one can describe scores of mutations, clinically they are classified into three or four subtypes. The three major clinical variants are: type I, the most common and least severe form; type II, generally fatal in utero or during the neonatal period; and type III, with severe consequences resulting in deformed limbs and dwarfism. Type I is inherited as an autosomal dominant trait, whereas types II and III are almost always either new mutations (which, if affected individuals were to reproduce, would be transmitted in an autosomal dominant manner) or are inherited as recessive traits; the latter likely result from mutations in enzymes that catalyze posttranslational modifications of procollagen. Some investigators also recognize type Ib or IV. Type IV is an uncommon variant similar to type I but in which the sclera are not affected. Others group these cases together with type I. Type Ib is a variant in which teeth are prominently affected.

(Choice 5) Stickler syndrome is caused by aberrant type XI collagen or type II collagen due to mutations in COL11A1, COL11A2, or COL2A1. It can be inherited as an autosomal dominant trait. Affected individuals demonstrate a wide variety of symptoms ranging from subtle to severe. Type XI and type II collagens have a similar tissue distribution and primarily are found in joints, including the temporomandibular, and in the spinal column, inner ear, and vitreous fluid of the eye. Persons with Stickler syndrome are generally characterized by a flattened facial appearance caused by underdevelopment of the bones of the mid face, including the cheekbones and the bridge of the nose. The syndrome may also include cleft palate, myopia, glaucoma, retinal detachment, hearing loss, hypermobile joints, and early-onset osteoarthritis.

(Choice 6) Mutations in FGFR1 or FGFR2, the genes that code for the fibroblast growth factor receptor cause Pfeiffer syndrome, an autosomal dominant condition characterized by premature fusion of skull bones (craniosynostosis), brachydactyly (flat broad thumbs and big toes facing away from the other digits), and syndactyly (webbing between digits). Type I Pfeiffer syndrome may be caused by mutations in either FGFR1 or FGFR2. These mutations cause early maturation of osteoclasts during embryogenesis, resulting in premature fusion of bones in the skull, hands, and feet. Although the craniosynostosis causes an unusual facies with bulging wide-set eyes, an underdeveloped upper jaw, and a peaked nose, most

individuals with type I Pfeiffer syndrome have normal intelligence and normal lifespan. However, persons with type II or III Pfeiffer syndrome, always due to mutations in FGFR2, suffer more severe symptoms, often involving the nervous system.

22. Question

1 points

The star quarterback for a university football team presents to the school physician 2 weeks after the onset of symptoms of infectious mononucleosis. He wants to return to playing football and is requesting medical clearance. He states that he feels fine; his muscle aches and fatigue have resolved. Upon examination, his heart and lungs are normal, his spleen is not enlarged, he has no temperature, and his liver enzyme values are normal. Which one of the following statements is correct regarding when he may return to playing football?

1. Since he seems fine, he may return to football immediately.
2. He should return for another check-up next week and possible clearance to play.
3. He should return for another check-up in 2 weeks and possible clearance to play. ✔
4. He may return to football when the mono-spot test result is negative.
5. He may return to football when the lymphocyte count returns to normal.
6. He is out for the remainder of the season (3 months) but may play again next season.

INCORRECT ✖

The correct answer is 3.

Assuming a general state of good health, the present return-to-play recommendation for athletes participating in contact sports who are recovering from infectious mononucleosis is that if the athlete has no splenomegaly or fever, results of liver function tests are normal, and all complications have resolved, he or she may return to contact sports 4 weeks after the onset of symptoms. Since, in the case described, symptoms started only 2 weeks ago, he needs to wait an additional 2 weeks and return for another check-up. Assuming he still is symptom free, he then will be cleared to play.

(Choice 1) He cannot return to football immediately simply because he feels fine 2 weeks after symptoms began; a possible complication of premature return to play is splenic rupture, which ensues in
0.1% 0.2% of cases; the rupture can be spontaneous or trauma-related. Rupture only occurs in enlarged spleens, and spleen enlargement may occur between days 4 and 21 after the onset of symptomatic illness. Thus, a final physical examination is essential no earlier than 4 weeks after the first symptoms.

(Choices 2,4 & 5) He should return next week for another check-up and possible clearance

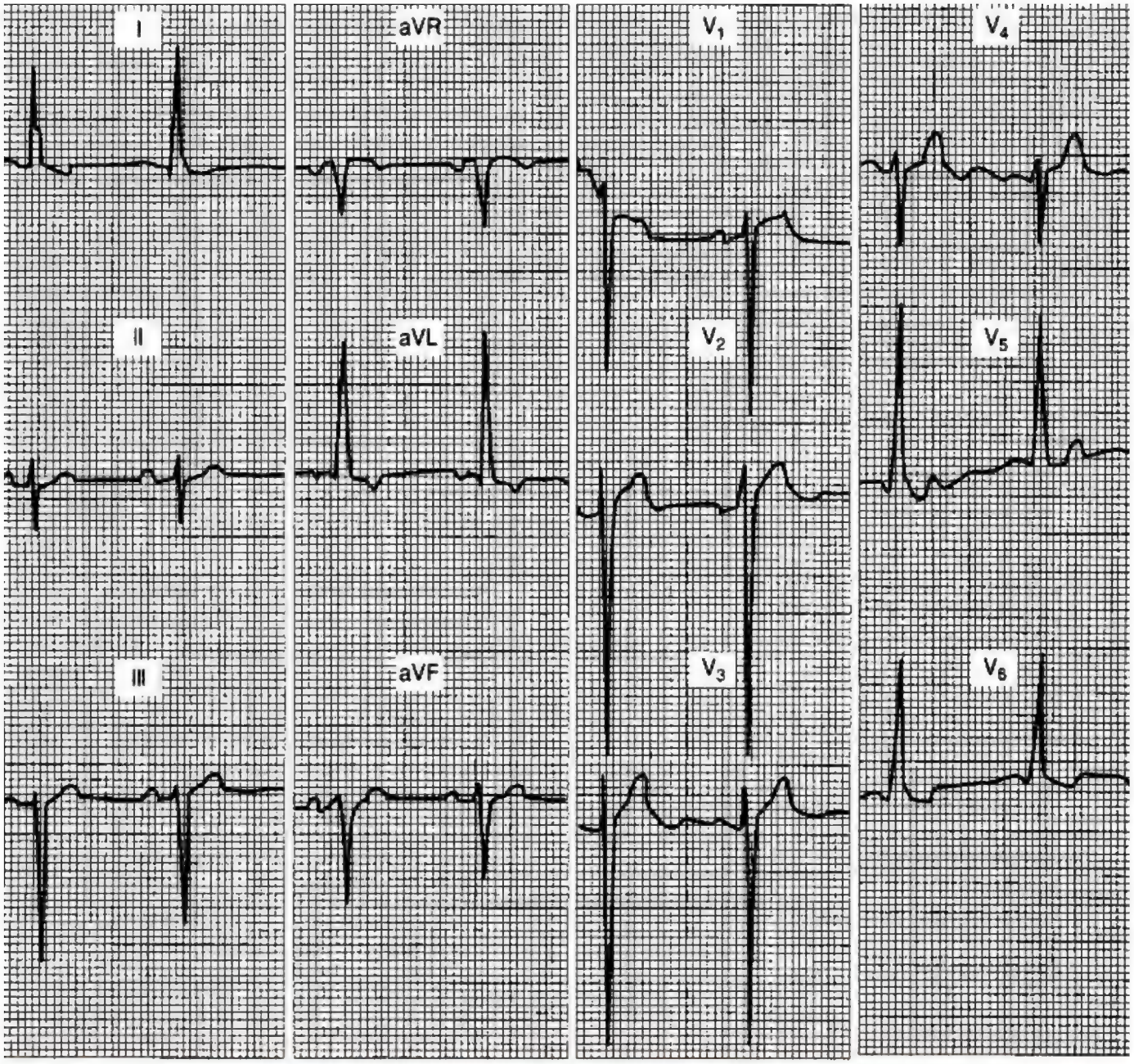
to play is incorrect since at this time only 3 weeks will have passed since symptom onset. Had he been participating in a noncontact sport, this would have been a permissible time interval. Approximately 10% of individuals with infectious mononucleosis will not develop a negative mono-spot test result (which tests for heterophile antibodies); therefore, a negative result should not be grounds for sending him back to play football. In those with a positive test result, it can take anywhere from 1 to 52 weeks before mono titers are undetectable. A normal lymphocyte count is not assurance that all complications have resolved or that splenomegaly is not present.

(Choice 6) Provided he passes the 4-week physical, there is no reason to keep him from playing football for the remainder of the season.

23. Question

1 points

A 65-year-old man with multiple myeloma presents with confusion, severe depression, vomiting, constipation, and polyuria. His electrocardiogram is shown below. Which of the following is the most appropriate first step in the management of this patient?



(https://www.amcquestionbank.com/wp-content/uploads/2015/11/Picture-Test-10-Q14.png)

1. Give calcium gluconate.
2. Infuse saline. ✔
3. Administer sodium bicarbonate.
4. Infuse furosemide.
5. Initiate mithramycin therapy.

INCORRECT ✖

The correct answer is 2.

This patient has clinical and electrocardiographic (ECG) evidence of hypercalcemia. The hypercalcemia is due to the production of osteoclast-activating factor by myeloma cells in the

bone marrow. The illustrated ECG shows shortening of the QT interval (0.28 0.3), which is the characteristic finding in hypercalcemia. Neuropsychiatric findings in hypercalcemia involve personality changes, confusion, depression, acute psychosis, or coma. Cardiovascular changes include hypertension, potentiation of cardiac glycosides, and shortening of the QT interval. Gastrointestinal signs and symptoms consist of nausea, constipation, peptic ulcer disease (calcium stimulates gastrin release), and acute pancreatitis. Pseudogout can occur in the joints. Metastatic calcification in the kidney produces nephrocalcinosis (calcification in the basement membranes of the tubules), which produces polyuria, natriuresis (leading to volume contraction), and problems with urine concentration. Saline infusion is the first step in management of hypercalcemia because it corrects volume contraction, which is a stimulus for further calcium reabsorption, and it enhances kaliuresis.

(Choice 4) Once hydration is achieved, a loop diuretic (e.g., furosemide) is added to potentiate the kaliuresis. If saline administration and furosemide are ineffective, or if chronic hypercalcemia is anticipated, a number of other options are available. Bisphosphonates are particularly useful in malignancy-induced hypercalcemia because they inhibit bone resorption. Corticosteroids are recommended in hypercalcemia associated with hypervitaminosis D, sarcoidosis, hematologic malignancies, and breast cancer.

(Choice 5) Mithramycin, an antineoplastic antibiotic, is generally effective but requires close monitoring because of its toxicity. Calcitonin is only effective for 1 or 2 weeks; then, hypercalcemia reappears.

(Choices 1 & 3) Sodium bicarbonate and calcium gluconate are useful in the treatment of hyperkalemia, not hypercalcemia.

24. Question

1 points

A 76-year-old woman sees her physician with complaints of muscle pain around the neck, a headache particularly intense in the temporal area, a tender scalp, and jaw pain when chewing. She says that these symptoms started about 3–4 weeks earlier and seem to be getting progressively worse. In addition, she has felt tired, lost her appetite, and as a result lost 5 lb. A more recent problem that she finds worrisome is blurred vision, in which a single object appears as two. Upon examination, she was found to weigh 140 lb (63.5 kg), to be 5 ft 5 in tall (1.65 m), have a temperature of 100.9°F (38.3°C), and a blood pressure of 125/82 mm Hg. Her heart rate and rhythms were regular, her lungs clear to auscultation, her abdomen was soft and nontender, the liver and spleen were of normal size, her temporal region was tender to touch, and she had small retinal hemorrhages. Which one of the following laboratory test or procedures will provide the most significant clue regarding the diagnosis?

1. A complete blood count
2. A computed tomography study of her head
3. An erythrocyte sedimentation rate determination ✔

4. A carotid ultrasound

5. A lumbar puncture with subsequent culture

INCORRECT ✖

The correct answer is 3.

The symptoms described suggest giant-cell arteritis, also known as temporal arthritis. This is a systemic condition affecting medium-sized and large arteries throughout the body, but having the greatest propensity to involve the temporal artery. It is a disease of the aged, with a mean onset in the 70s, and it affects women more often than men. The symptoms are as those described; however, up to 40% of patients have additional symptoms, including cardiac irregularities, thoracic aorta aneurysms, and respiratory problems. The nature of these symptoms depends upon which other arteries are involved; in fact, classic polymyalgia rheumatica and classic temporal arteritis are believed to be the opposite extremes of a continuum of conditions due to the same underlying cause, with many patients showing symptoms of both entities. In both conditions, an exceedingly high erythrocyte sedimentation rate (ESR) is almost diagnostic. In temporal arteritis, ESR values are over 50 mm/h in more than 90% of patients and often exceed 100 mm/h (although the exact value is laboratory-specific, the normal rates are usually considered to be less than 10 mm/h for males and less than 15 mm/h for females). Although the ESR is increased in most inflammatory conditions, the magnitude of the increase is rarely this great; thus, the sensitivity is good but not perfect since about 5% of affected individuals provide false-negative values with ESR values below 40 mm/h. C-reactive protein and interleukine-6, other sensitive markers of inflammation, are also increased, and particularly the latter may prove to be even more sensitive than the ESR. However, the test is more expensive and not widely obtainable, and available data are limited. The definitive diagnosis is made by temporal artery biopsy. Treatment with a corticosteroid must be started immediately to prevent blindness, even before laboratory of biopsy results are available.

(Choice 1) A complete blood count is of limited value. The most significant finding will be a normal white cell count, which will rule out infection and some other inflammatory conditions.

(Choices 2,4 & 5) A computed tomography study of her head, a carotid ultrasound study, or a lumbar puncture with subsequent culture will contribute little to the diagnosis.

25. Question **1 points**

A 22-year-old woman has had undiagnosed acute intermittent gastrointestinal pains since the age of 17. However, today she presents at an emergency clinic with such severe abdominal pain that the resident on duty seriously considered recommending an emergency laparotomy to find out what is wrong. However, he reconsidered after she complains about pain in both feet, becomes semi-incoherent, and starts to act abnormally. Despite her semi-incoherent state, he elicited the fact that she recently started having sexual relations with her first serious boyfriend, and as a consequence, started taking an estrogen based contraceptive. In addition, to make sure she remained attractive

to this, “her one and only love of her life,” last week she started a 1,200-calorie/day diet. Further questioning disclosed that her father had been bothered by intermittent stomach pains for many years, and although these annoyed him, they never were severe enough to require medical attention. Otherwise, both parents, now in their mid-50s, seemed healthy. A physical examination was unremarkable except for borderline hypertension; the resident suspected that the pain in her feet was due to peripheral neuropathy. A blood panel indicated that she suffered from hyponatremia. On the basis of the foregoing information, the resident made a tentative diagnosis. To confirm his suspicion, he asked the laboratory to run a urine analysis for which one of the following compounds?

1. Porphobilinogen ✔
2. Uroporphyrin
3. Uroporphyrinogen I
4. Coproporphyrinogen I
5. Coproporphyrinogen III
6. Lead

INCORRECT ✖

The correct answer is 1.

A deficiency of uroporphyrinogen I synthetase activity (aka, porphobilinogen deaminase) is inherited as an autosomal dominant trait and is responsible for a disease known as acute intermittent proporphyria. This disease is characterized by intermittent bouts of acute gastrointestinal attacks causing extreme pain; occasionally, during one of these sessions (which in some patients may last for an extended period), there is also constipation, urinary retention, hypertension, and neurologic symptoms that may include neuropathies, seizures, and psychotic episodes. The neural problems are likely caused by hyponatremia, which is in part caused by inappropriate release of antidiuretic hormone and in part due to gastrointestinal loss. After standing, the urine voided during an attack turns dark to a color sometimes described as muddy reddish or purplish. Uroporphyrinogen I synthetase catalyzes the condensation of four molecules of porphobilinogen to form uroporphyrinogen III, the first ring product in heme synthesis. Because uroporphyrinogen I synthetase activity is inadequate during an attack, the substrate, porphobilinogen, accumulates and is excreted in the urine, a finding considered to provide the definitive diagnosis. Although this disease is autosomal dominant, its penetrance is low and the disease may appear to skip generations. Clinical symptoms are most commonly reported by women beginning in their teens or 20s. Presumably, the intermittent nature of the condition reflects the fact that the uroporphyrinogen I synthetase activity inherited from the non-affected parent is borderline sufficient, and attacks only occur when triggered by some factor that causes a need for greater activity. Such known precipitating factors include a long list of drugs, most, if not all, of which share the property of being metabolized by the P450 cytochrome (heme) system. The implied mechanism is that activation of the P450 enzymes reduces the availability of free

heme, a feedback inhibitor of heme synthesis; this releases the heme synthesis sequence of reactions from partial inhibition and produces porphobilinogen at an accelerated rate, faster than the limited activity of the remaining uroporphyrinogen I synthetase activity can use it. Among the drugs that induce an attack are barbiturates, commonly used in test questions as an example, and the estrogens, used as an example in the case presented. However, in addition to being triggered by drugs, attacks are also induced by infections and caloric deprivation (used as an ancillary precipitating factor in the vignette). An acute attack can be life-threatening, and emergency treatment by intravenous hematin (an inhibitor of the first step in heme synthesis) and glucose coupled with administration of an analgesic that is not metabolized by the P450 system is often used as the first line of treatment. Long-term treatment is avoidance of known precipitating factors and maintenance on a high-carbohydrate diet, at least 300 g of carbohydrate per day.

(Choice 2) accumulates in porphyria cutanea tarda, a condition caused by an inherited deficiency of uroporphyrin decarboxylase; this is the most common of the porphyrias.

(Choices 3 & 4) Uroporphyrinogen I and coproporphyrinogen I accumulate in the urine of patients with congenital erythropoietic porphyria, a disease in which uroporphyrinogen III cosynthetase activity is lacking.

(Choice 5) accumulates in hereditary coproporphyria because of a deficiency of coproporphyrinogen oxidase. Congenital erythropoietic porphyria is inherited as an autosomal recessive trait, the rest of the porphyrias as autosomal dominant conditions. In each of the diseases described with respect to choices 2, 3, 4, and 5, the intermediates that accumulate have the heme-like tetrapyrrole structure, and consequently, patients are photosensitive. This sensitivity is thought to be due to superoxide free radicals produced via the reaction of the tetrapyrrole compound with oxygen in a reaction catalyzed by ultraviolet light. Note that acute intermittent proporphyria is the only porphyria that is not light sensitive, because a tetrapyrrole compound does not accumulate.

(Choice 6) is an extremely toxic heavy metal with an affinity for SH groups. As a consequence, it inhibits several enzymes, two of which are involved in heme synthesis-8-aminolevulinic synthase, the first and rate-limiting enzyme in heme synthesis, and ferrochelatase, the last enzyme. Consequently, lead poisoning, among other effects, causes a microcytic anemia.

26. Question

1 points

A 47-year-old man presents to a physician at a free clinic complaining of upper abdominal pain, severe heartburn, nausea, bloating, and vomiting of undigested food. He also states that he eats little because he feels full almost immediately upon eating; consequently, he has been losing weight. Upon taking a history, the physician finds that the patient was diagnosed with diabetes at the age of 6 years. The patient further admits that, although initially his parents made sure he kept his glucose levels under tight control, as he grew older he became careless, mainly because he could not afford health insurance. Consequently, he has been self-treating with insulin obtained illegally via the Internet. He believed that worked well since, until now, he had no real health problems except a need for glasses. He solved that problem by buying a cheap pair on display at a

local drug store. His physician arranged for hemoglobin A1c analysis; the value was 11.5%. Although the free clinic couldn't afford a sophisticated follow-up test, such as scintillation scanning, the physician believed the symptoms described were sufficient to prescribe treatment. Which one of the following drugs did the physician prescribe as the first step in treatment?

1. Metoclopramide ✔
2. Adiponectin
3. Sitagliptin
4. Pramlintide acetate
5. Exenatide

INCORRECT ✖

The correct answer is 1.

This man undoubtedly is suffering from type 1 diabetes and has developed diabetic gastroparesis, a condition reported to occur in at least 12% of individuals who have had diabetes for 10 or more years. Gastroparesis is caused by damage to the vagus nerve and often accompanies other diabetic complications such as nephropathy, retinopathy, and peripheral neuropathy. The vagus normally transmits signals to the digestive system, causing the stomach and intestines to contract in a synchronous fashion, maneuvering food undergoing digestion from the stomach into and then through the intestines. The neuropathy underlying diabetic gastroparesis interrupts these signals, and food backs up in the stomach. In addition to the symptoms described, this makes production of glucose after a meal erratic and contributes to problems with the regulation of glucose levels. Over an extended period, bacterial growth may occur in the undigested food, and the food may form hard lumps, called bezoars, which might eventually block a person's digestive system. As the first course in treatment, his physician would most likely recommend eating smaller meals more often and would write a prescription for an agent that stimulates gastric emptying and increases intestinal contractions, thus helping to move the food out of the stomach and along the intestines. At present, few medications are available to treat gastroparesis. Those most commonly employed are metoclopramide, erythromycin, domperidone, and cisapride. In addition to stimulating gastric emptying, its action in the brain helps control the vomiting reflex; thus it acts as both a prokinetic agent and an antiemetic. Unfortunately, it should not be used longer than 3 months because it has a risk of causing irreversible tardive dyskinesia. Getting his diabetes under control is, of course, advisable but this would be a long-term project, made even more difficult because of the patient's limited resources. **(Choice 2)** is a hormone produced by adipocytes that helps regulate glucose and lipoprotein levels. Studies to date have largely been limited to mice; therefore, no physician could write a prescription for it. Sitagliptin, pramlintide acetate, and exenatide **(Choices 3,4 & 5)** are all drugs used to treat type 2 diabetes and could have no function in cases involving type 1 diabetes. In addition, pramlintide acetate and exenatide also can delay food from moving out of the stomach-not a good property for treating gastroparesis.

27. Question **1 points**

A 36-year-old man with type 1 diabetes left for work one Friday morning in late September feeling fine, but by the time he came home at 6 PM, he was complaining of a headache and general malaise. His wife had him lie down before dinner; by dinner time, he felt worse and had also developed a cough, sore throat, aching muscles, and a temperature of 10^{3}°F (39.4°C). He suspected he had caught the flu from colleagues at work. He had no appetite, and his wife suggested he go directly to bed and try to get a good night's sleep. He did so, but by morning, he was no better. Because he was extremely thirsty but still had no appetite, his wife gave him an 8 ounce glass of orange juice in lieu of his usual breakfast. Usually, he checked his blood glucose level before going to bed and upon rising to estimate his optimal insulin therapy. However, because he felt so poorly, he neglected to take any insulin the previous night and only took a minimal dose in the morning, figuring that he ate very little. After drinking his orange juice and injecting the insulin, he fell back to sleep. Two hours later, he woke up because he had to urinate. In addition, he was uncomfortable because his mouth was very dry, he was extremely thirsty, his vision was blurred, he had a stomach ache, he expressed some difficulty with breathing, and he was nauseated and vomited. Which one of the following choices describes the most critical next step to take in the treatment of this individual?

1. Check for elevated levels of urinary ketones. ✔
2. Check for hypoglycemia.
3. Administer oseltamivir.
4. Administer acetaminophen.
5. Administer zolpidem.

INCORRECT ✖

The correct answer is 1.

Diabetic ketoacidosis (DK) can develop quickly in a diabetic person (particularly in a type 1 diabetic) whenever insulin levels are permitted to decline below the required level. In the case described, the extremely dry mouth, extreme thirst, and blurred vision are typical signs of very high serum glucose levels, and the stomach ache, difficulty with breathing, nausea, and vomiting, although possibly caused by the flu itself, are more typically early signs of DK. Several clues suggest that the patient was grossly insulin deficient:

(a) the presence of the aforementioned early signs of DK;

(b) that he already missed his normal evening insulin dose;

(c) the stress hormones generated by the flu would have increased his normal insulin dose requirement and acted to counteract the insulin remaining in his system;

(d) his minimal morning insulin dose was very likely too little to counteract the effects of the

load of glucose provided by the 8 ounce glass of orange juice, let alone to have overcome the earlier deficiency.
An insulin deficiency prevents glucose from entering muscle and adipose cells; instead, levels build up in the blood. Excess blood glucose spills into the urine, taking water with it and causing excess thirst. The excess circulating level induces excess glucose to enter into the lens of the eye, producing an osmotic imbalance resulting in blurred vision. Because muscle and adipose tissue cannot absorb glucose, these tissues begin to depend upon fat for energy, increasing the degradation of fatty acids into acetyl CoA, which can't be metabolized to carbon dioxide (CO_2) because pyruvate levels are too low; instead the excess acetyl CoA is converted to acetoacetate, β-hydroxybutyrate and acetone, collectively known as ketones. In addition, H^+ accumulates. This condition is known as ketoacidosis, which, if left untreated, will cause loss of consciousness and eventual death. Since untreated DK can be fatal, it is important to determine if a patient's ketone level is markedly elevated, making, checking for elevated levels of urinary ketones, the most critical next step among those listed for treating this patient. This can be done at home using a commercially available dip stick.
(Choice 2) essentially is nonsense since all the data provided point to hyperglycemia. On the other hand, if this choice were check for hyperglycemia or even simply to check the serum glucose value, it would have been correct because the value would likely have been higher than 300 mg/dL (16.5 mmol/L); high enough to persuade the patient to inject another bolus of insulin and/or consult a physician.
(Choices 3,4 & 5) Administering oseltamivir, acetaminophen, or zolpidem might help treat the flu and its symptoms but would not directly affect the course of DK.

28. Question

1 points

A 54-year-old woman contracted a mild case of poliomyelitis in 1953, from which she completely recovered. In high school and during college, she participated in sports. After college, she participated in an annual local marathon until 1986, when she had to pull out of the race because of fatigue, which she attributed to a normal consequence of aging and not being in top physical shape. Since then, there has been a slow progressive weakening of her leg muscles not noticeable on a day-by-day basis. However, she is now consulting a physician because her calf muscles have begun to atrophy, and she has trouble straightening her back. The most probable diagnosis is which of the following?

1. Postpolio syndrome ✔
2. Amyotrophic lateral sclerosis
3. Osteoarthritis
4. Tendinitis
5. Guillain-Barré syndrome

INCORRECT ✖

The correct answer is 1.

Poliomyelitis, also known as infantile paralysis, was the scourge of the first half of the 20th century. Ironically, its prevalence increased as sanitation improved, because prior to that, persons were first exposed to the virus as infants while still protected by antibodies in their mother's milk; consequently, the most severe aspects of infection were mitigated and they developed long-term immunity. By the 1920s through the 1950s, polio epidemics occurred annually until Salk developed an injectable killed vaccine first widely used in 1954 and 1955; this was followed by Sabin's attenuated virus oral vaccine in 1963. Consequently, there has not been a case of polio since 1979 (on occasion it has been observed in an immigrant. However, the effects of poliomyelitis are still with us. Individuals tend to develop a condition known as postpolio syndrome 10–40 years after having had paralytic polio. This condition is characterized by slowly developing but progressively worsening symptoms that include fatigue and muscle weakness; commonly, joint pains and scoliosis also occur. Although the condition can be debilitating, it is only life-threatening if it affects the muscles of respiration. It is thought that postpolio syndrome is caused by fatigue of motor neurons, which serve more muscle fibers than normal after their former partner neurons were killed by the virus; one line of thought is that the condition can be aggravated by excess use. No known treatment modality exists, and most experts recommend limited, non fatiguing exercise.

(Choice 2) Amyotrophic lateral sclerosis, sometimes called Lou Gehrig's disease, is also a disease of motor neurons, but usually of unknown cause. It starts somewhat innocuously with weakness in a hand, foot, or leg, but then progresses, causing degeneration of anterior horn cells throughout the brain and spinal cord. Usually within 2–10 years after diagnosis, death ensues. The drug riluzole tends to slow, but does not stop, progression of the disease. Although most cases have no known cause, a mutated SOD1 gene has been implicated in 2% of the cases, and about 20% of the cases have a familial connection.

(Choices 3 & 4) Osteoarthritis and tendinitis are both conditions that can develop because of overuse but usually at an older age, and a history of polio is rarely present; neither are characterized by fatigue or muscle weakness of the kind associated with postpolio syndrome.

(Choice 5) Guillain-Barré disease, also known as acute idiopathic polyneuropathy, is characterized by weakness that usually begins in the legs and spreads upward, frequently to the arms and face. Typically, it is symmetric, and the extent of weakness varies from case to case. It primarily affects motor neurons, but distal paresthesias and dysstasias commonly occur. Onset of the disease frequently follows immunizations, surgical procedures, or infections; an association with Campylobacter jejuni enteritis has been particularly well documented. Most patients recover spontaneously over a period of months, but about 10%–20% retain some degree of disability.

29. Question **1 points**

A 29-year-old man suffered from hepatitis, splenomegaly, a Coombs-negative hemolytic anemia, and portal hypertension during his adolescent and earlier adult years. Now, he is showing signs of behavioral and personality changes with emotional lability. In addition, he has a profound resting tremor, his speech has become slurred and difficult to understand, and he drools and has trouble swallowing. Physical examination shows a rim of brown pigment around the perimeter of the cornea. Which one of the following laboratory findings would most likely be reported?

1. Decreased serum ceruloplasmin ✔
2. Increased serum ferritin
3. Increased serum mitochondrial antibodies
4. Increased total serum copper
5. Normal serum prothrombin time

INCORRECT ✖

The correct answer is 1.

The patient has Wilson disease, which is an autosomal recessive disease due to genetic aberration in the "Wilson" gene on chromosome 13; the worldwide prevalence is 30 cases per 106 persons. More than 200 different mutations have been uncovered, leading to some variation in symptoms. However, typically, the disease first presents in adolescence with liver disease plus a variety of hemolytic and other symptoms, then progresses in early adulthood to neurologic problems similar to those described. Once the disease progresses to the neurologic state, a Kayser-Fleischer ring (brown pigment around the perimeter of the cornea) is essentially pathognomic for the condition. The genetic defect affects a copper-transporting ATPase (ATP7B) in the liver and leads to accumulation of copper in the hepatocytes and oxidative damage to hepatic mitochondria. The major physiologic effects are due to a defect in the hepatocyte transport system for copper secretion into bile, leading to increased copper deposition in liver, brain, cornea, and kidneys. In addition, copper cannot be incorporated into an 2-globulin to produce ceruloplasmin, which is the copper-binding protein. Normally, the total serum copper equals copper that is bound to ceruloplasmin (95% of the total) plus copper that is unbound (free). In Wilson disease, the total serum copper level is decreased {not increased **(Choice 4)**} because ceruloplasmin is decreased. However, the free copper level in the serum and urine is increased because of defective excretion in the bile and subsequent accumulation of copper in the serum. Excess copper is deposited in Descemet's membrane of the cornea of the eye (producing Kayser-Fleischer ring) and in the basal ganglia. In the latter location, it may cause parkinsonism, choreiform movements, and dystonia in the bulbar musculature. This latter effect can produce dysarthria (problems with speech and/or drooling) and/or dysphagia.

(Choice 2) Increased serum ferritin in the setting of chronic liver disease is associated with hemochromatosis, an autosomal recessive disease with unrestricted reabsorption of iron from the gastrointestinal tract. Hemochromatosis is not associated with corneal abnormalities or a movement disorder.

(Choice 3) is a marker for primary biliary cirrhosis, an autoimmune disease characterized by destruction of bile ducts in the portal triads. It is not associated with corneal abnormalities or a movement disorder. Since the patient has chronic liver disease (chronic hepatitis or cirrhosis), the prothrombin time is most likely increased {not normal **(Choice 5)**} because of decreased synthesis of coagulation factors in the damaged liver.

30. Question

1 points

A 19-year-old man born and brought up in Brooklyn, New York, visited his grandfather who lived in western North Carolina. His grandfather, wanting to give him a taste of the life of his ancestors, took him hunting. The following week, after his return to Brooklyn, he presents with fever, lethargy, headache, and abdominal pain. Petechial lesions are noted on the palms of his hands and soles of his feet. Which of the following is the arthropod vector most likely responsible for this disease?

1. Flea
2. Louse
3. Mite
4. Chigger
5. Tick ✔

INCORRECT ✖

The correct answer is 5.

All of the insects listed are vectors of rash-producing diseases caused by microorganisms in the Rickettsiae family. The man in the case described has Rocky Mountain spotted fever, which is due to the bite of a hard tick (Dermacentor andersoni) a vector for Rickettsia rickettsii. A diagnostic triad for the disease is rash, fever, and history of exposure to a tick. The incubation period is approximately 2–12 days after exposure. Unlike the other rickettsial organisms, which cause a rash extending from the trunk to the extremities in centrifugal fashion, the rash of Rocky Mountain spotted fever begins on the palms and soles and spreads to the trunk. The rash is due to a vasculitis caused by the rickettsial organisms invading the endothelial cells of small vessels and producing petechial lesions. Oklahoma and North Carolina share the lead for the highest incidence of Rocky Mountain spotted fever. The diagnosis is best made serologically using indirect immunofluorescent techniques rather than the outdated Weil-Felix reaction, which has a positive Proteus vulgaris OX-2 and OX-19 reaction. Doxycycline is the treatment of choice. The mortality rate is 20% without treatment and 5% with treatment.

(Choice 1) The vector for murine typhus and the plague is the flea, and the disease-causing agent for typhus is R. typhi. The typical hosts are mice and rats, but the disease has also been transmitted by cats and opossums. The disease-causing agent for the plague is Yersinia pestis. The typical host is the rat, but it is also carried by other rodents, including the ground squirrel. Historically, plague epidemics killed millions, but since 1950, outbreaks have been sporadic and isolated due to modern sanitation, rodent control, and use of antibiotics.
(Choice 2) The typical vector for epidemic typhus is the human body louse. The disease-causing organism is R. prowazekii. Epidemic typhus is typically transmitted from human to human via the louse, under unsanitary conditions, and epidemics are often associated with wars.
(Choices 3 & 4) Mites carry rickettsial pox. The primary host is the mouse, and the causative agent is R. akari. Mites also cause severe pruritic conditions, but directly by their bite, rather than serving as vectors. Scrub typhus is transmitted by mites. The disease-causing organism is R. tsutsugamushi, a distinct genus and species in the Rickettsiae family. Cases of scrub typhus primarily occur in Oceania and the Far East.

31. Question

1 points

A 28-year-old woman who habitually fed feral cats is bitten on the hand by one in the neighborhood park. Twenty-four hours later, the hand is swollen, and there is swelling and warmth around the puncture sites of the bite. Which one of the following organisms is most likely responsible for these findings?

1. Bartonella henselae
2. Pasteurella multocida ✔
3. Staphylococcus aureus
4. Group A streptococci
5. Pseudomonas aeruginosa
6. Eikenella corrodens

INCORRECT ✖

The correct answer is 2.

Pasteurella multocida is the organism that most commonly infects the deep puncture wounds characteristic of cat bites. Signs of infection arise within 24 hours. There is also a potential for developing tendinitis and osteomyelitis. P. multocida responds to amoxicillin, penicillin G, or ampicillin.

(Choice 1) is the cause of cat-scratch fever. In this disease, there are granulomatous microabscesses in lymph nodes draining the infection site. In all bites (animal and human),

the mainstay of therapy is proper cleansing of the wound with soap and water. All bites on the extremities should be treated aggressively because of the potential for septic arthritis and tenosynovitis.
(Choices 3,4 & 5) Staphylococcus aureus, Pseudomonas aeruginosa, and group A streptococci are not common pathogens in cat bites with symptoms presenting in the first 24 hours.
(Choice 6) Antimicrobial amoxicillin prophylaxis is recommended for all human bites and most cat bites (due to Eikenella corrodens). High-risk dog bites requiring antibiotic prophylaxis (e.g., amoxicillin) are those on the hand, those associated with puncture wounds, and wounds that are more than 6–12 hours old.
The risk of tetanus is always greater in contaminated wounds, puncture wounds, and wounds that come late to medical attention. In general, tetanus toxoid protects a person for 10 years. Tetanus immunoglobulin is reserved for dirty wounds in persons who have never been immunized (never received the primary series of three doses of tetanus toxoid) or whose status is unknown. If more than 5 years have elapsed since the last booster shot, a tetanus booster should be administered for a dirty wound (bite).
The decision for rabies prophylaxis in animal bites depends on the circumstance of the bite and the local prevalence of rabies. In this country, rabies is most commonly contracted from the bites of bats, skunks (most common), raccoons, and squirrels rather than dogs. In dogs or cats, a period of 10 days is sufficient to determine whether the animal is rabid. Strays or wild animals should be sacrificed and examined for rabies. If postexposure prophylaxis is required, washing the wound with soap and water is the first step in management. Half the dose of rabies immune globulin should be administered in the wound site and the other half in the gluteal region. Rabies vaccine is administered the same day and given at varying time intervals. Without treatment, there is a 100% fatality rate.

32. Question

1 points

A 40-year-old nurse has been complaining for years about long work hours, poor pay, and lack of concern from her supervisors for her well-being. However, despite her constant complaining, she reports to work punctually and gets her work done in a yeoman-like fashion. She starts to also complain of recurrent episodes of forgetfulness, associated with bouts of sweating, palpitations, anxiety, tremulousness, and fainting. As a consequence, she asks for a medical leave with pay. Before granting her request, she is given a physical examination. Laboratory studies show a serum glucose level of 55 mg/dL (normal, 70-110 mg/ dL), elevated serum insulin levels, and a suppressed level of serum C-peptide. Which of the following is the most likely cause of the hypoglycemia?

1. Benign tumor of β islet cells
2. Ectopic secretion of an insulin-like factor
3. Malignant tumor of islet cells

4. Pancreatic carcinoma
5. Injection of human insulin ✔
6. Factitious disorder

INCORRECT ✖

The correct answer is 5.

When preproinsulin in the β islet cell is delivered to the Golgi apparatus, proteolytic reactions generate insulin and a cleavage peptide called C-peptide. Therefore, C-peptide is a marker for endogenous synthesis of insulin. Injection of human insulin increases serum insulin and produces hypoglycemia. Hypoglycemia suppresses β islet cells, causing a decrease in endogenous synthesis of insulin and a corresponding decrease in serum C-peptide. In this case, the nurse was tittering her glucose level so that she would show clear symptoms of hypoglycemia without invoking serious central nervous consequences (serum levels below 50 mg/dL). Her motivation is to get time off with pay, an external motivation. Consequently, she is malingering. It is not a factitious disorder **(Choice 6)** because to be so the motivation must be internal, driven by a psychologic need.

(Choice 1) Benign tumors of the β islet cells, or insulinomas, synthesize excess insulin, causing a severe fasting hypoglycemia. Both serum insulin and serum C-peptide levels are increased. Serum C-peptide is decreased in this patient.

(Choice 2) that causes hypoglycemia is most often produced by a hepatocellular carcinoma. Since the insulin-like factor is not measured in the serum as insulin, hypoglycemia suppresses β islet cells, resulting in a decrease in serum insulin and C-peptide. The patient has an increase in serum insulin and a decrease in C-peptide.

(Choice 3) Malignant tumors of islet cells secrete glucagon, which produces hyperglycemia by stimulating gluconeogenesis. The patient has hypoglycemia.

(Choice 4) Pancreatic carcinomas usually develop in the head of the pancreas, causing obstruction of the common bile duct and an obstructive type of jaundice. The patient does not have jaundice. Furthermore, pancreatic carcinomas do not secrete insulin or insulin-like factors to produce hypoglycemia.

33. Question

1 points

A 42-year-old woman with a body metabolic index (BMI) of 42 kg/m^2, who does not smoke, presents with diastolic hypertension and menstrual irregularities. Pertinent findings upon physical examination are a full, plethoric-appearing face, increased facial hair, predominantly truncal obesity with purple stria around the abdomen, and scattered ecchymoses over the entire body. Laboratory studies indicate a hemoglobin (Hb) level of 18 g/dL (normal, 12-16 g/dL), a white blood cell (WBC) count of 18,000 cells/mm^3 (normal, 4,500-11,000 cells/mm^3), and a normal platelet count. The

leukocyte differential shows an absolute neutrophilic leukocytosis and absolute lymphopenia and eosinopenia. Which of the following screening tests is most useful in the initial workup of this patient?

1. Captopril-enhanced renal radionuclide test
2. Plasma cortisol at 8 AM and 4 PM
3. Clonidine suppression test
4. Bone marrow aspiration and biopsy
5. Low-dose dexamethasone suppression test ✔

INCORRECT ✖

The correct answer is 5.

The patient has Cushing syndrome, which is a state of hypercortisolism. There are several causes. Iatrogenic Cushing syndrome, which occurs most commonly in a patient taking corticosteroids, is the major nonpathologic cause. Pituitary Cushing syndrome is the most common pathologic cause of Cushing syndrome (~60% of cases). It is most often due to a benign pituitary adenoma secreting adrenocorticotropic hormone (ACTH). Adrenal Cushing syndrome and ectopic Cushing syndrome account for the remainder of causes of the syndrome. Adrenal Cushing syndrome is most often due to a benign adenoma secreting cortisol. The excess cortisol suppresses plasma ACTH. Ectopic Cushing syndrome is most often caused by a small-cell carcinoma of the lung with ectopic production of ACTH.

Clinical findings in Cushing syndrome are protean and parallel the excessive production of cortisol, weak mineralocorticoids (e.g., deoxycorticosterone), and 17-ketosteroids, which are weak androgens (e.g., dehydroepiandrosterone sulfate). Truncal obesity is a characteristic finding. Excess fat is distributed in the face ("moon face"), cervical area ("buffalo hump"), and abdomen, with sparing of the extremities. This peculiar distribution is due to the lipogenic effect of insulin, which is released in response to hyperglycemia caused by hypercortisolism (cortisol is a gluconeogenic hormone). Since most of the substrates for gluconeogenesis derive from amino acids, and amino acids are in abundance in muscle tissue, muscle catabolism is prominent in the arm and leg muscles. Wide purple striae are secondary to weak subcutaneous tissue and vessel instability, leading to ecchymoses and bleeding into the stretch marks. This tissue instability is the result of the inhibitory effect of cortisol on collagen synthesis. Hypertension in Cushing syndrome is associated with increased release of weak mineralocorticoids and subsequent retention of sodium. Hirsutism is due to an increased concentration of 17-ketosteroids, which are weak androgens. The plethoric face is due to vessel engorgement from secondary polycythemia induced by cortisol-enhanced erythropoiesis. Severe osteoporosis can result from cortisol's potentiation of the effects of parathyroid hormone and vitamin D on bone. Menstrual irregularities (usually amenorrhea) and mental aberrations round out the clinical picture. Hypercortisolism has an effect on the

leukocyte count. Cortisol decreases neutrophil adhesion to endothelial cells, resulting in a neutrophilic leukocytosis; increases adhesion of lymphocytes in efferent lymphatics, which produces lymphopenia; and is cytotoxic to eosinophils, causing eosinopenia.
Laboratory testing for pathologic causes of Cushing syndrome involves the use of screening tests to establish the diagnosis and other tests to determine the type of Cushing syndrome. After documenting an increased level of serum cortisol, most clinicians screen for Cushing syndrome with a low-dose (1 mg) dexamethasone (an analogue of cortisol) suppression test to see if the high-baseline cortisol can be suppressed to less than 5 µg/dL. Patients with pituitary, adrenal, and ectopic Cushing syndrome do not suppress cortisol below 5 µg/dL. False-positive results can occur in stressed patients and in obese patients.
(Choice 2) There is an increased false-positive loss of the normal diurnal rhythm of serum cortisol (high at 8 AM and low at 4 PM) in stressed or obese individuals; therefore, loss of a diurnal rhythm is not a useful screening test. Another excellent screening test is a 24-hour urine collection for free cortisol. This test, along with a low-dose dexamethasone suppression test, clearly confirms the presence of Cushing syndrome; however, they do not provide information as to the cause of the syndrome.
To determine the type of Cushing syndrome, the high-dose dexamethasone test (8 mg/day) has the highest specificity. Hypercortisolism in pituitary Cushing syndrome can be suppressed, whereas that associated with adrenal and ectopic Cushing syndrome cannot be suppressed. Plasma ACTH is also a useful study. Patients with adrenal Cushing syndrome have decreased levels, those with pituitary Cushing syndrome have normal to slightly increased levels, and patients with ectopic Cushing syndrome have extremely high concentrations.
(Choice 1) A captopril-enhanced renal radionuclide test is used to document renovascular hypertension, which is most commonly due to atherosclerosis of the renal artery in elderly men or fibromuscular hyperplasia of the renal artery in young to middle-aged women. Other than hypertension, renovascular hypertension has no other parallel signs and symptoms with Cushing syndrome.
(Choice 3) is used to confirm pheochromocytoma caused by a tumor secreting excess catecholamines. Clonidine is a centrally acting adrenergic drug that cannot suppress the excessive catecholamines associated with a pheochromocytoma. A pheochromocytoma presents with paroxysmal hypertension, drenching sweats, and excessive anxiety, findings that are not present in this patient.
(Choice 4)A bone marrow examination, ostensibly as a workup of polycythemia in this patient, is not indicated.

34. Question **1 points**

A 20-year-old man, a recent immigrant from Eastern Europe, comes to his family physician with a history of chest pain and difficulty in breathing. He also complained of becoming dizzy when he tries to lift boxes at work. He had never been to a physician before. His family history was positive for hypertension. On examination, his blood pressure was 130/100 mm Hg, pulse 82/min with a distinct double peak, respirations 18/min and regular, and his temperature was normal. Oxygen

saturation on room air was 98%. The apical pulse was prolonged, and a loud S4 sound and an ejection systolic murmur was heard over the left sternal area. An electrocardiogram (ECG) showed left ventricular hypertrophy with some Q waves. An echocardiogram showed decreased left ventricular space due to asymmetric left ventricular hypertrophy. The best medication for this patient would be which one of the following?

1. Digoxin
2. Atenolol ✔
3. Diltiazem
4. Furosemide
5. Angiotensin-converting enzyme inhibitors

INCORRECT ✖

The correct answer is 2.

This patient has hypertrophic cardiomyopathy. The history of syncope, dyspnea, and chest pain are secondary to decreased outflow and obstruction. During systole, the left ventricular outflow is decreased due to decreased chamber volume and displacement of the anterior mitral valve leaflet forward. In addition, the aortic valve closes prematurely and reopens thereafter. All these factors play a role in the symptomatology. Patients with hypertrophic cardiomyopathy can die suddenly due to dangerous ventricular arrhythmias. Atenolol, a β blocker, will slow the heart and allow more time for diastolic filling, thereby enhancing the out-flow volume and decreasing obstruction to some extent. In almost s0% of cases, symptoms of chest pain, dyspnea, and arrhythmias, if present, will be relieved.

(Choice 1) is incorrect. Digoxin will increase cardiac contractility, which is not the problem here. It will further compromise the volume of blood being released into the greater circulation, and may lead to ventricular arrhythmias, with disastrous consequences.

(Choice 3) is incorrect. Calcium channel blockers like diltiazem or verapamil can be administered to improve diastolic function, which accounts for initial improvement, but they also induce peripheral vasodilatation, which then increases outflow obstruction, leading to deterioration. The patient may feel better initially, only to feel worse later.

(Choice 4) is incorrect; furosemide or other diuretics are not indicated here because this patient does not have cardiac failure and fluid retention.

(Choice 5) is incorrect; an angiotensin-converting enzyme inhibitor (ACE inhibitor) is indicated in dilated cardiomyopathy.

35. Question **1 points**

Two 16-year-old boys who did not know each other were admitted to a metropolitan county hospital on the same day for a broken tibia and fibula. The one boy was handsome, had an outstanding physique, and was the star quarterback for his high school team; he broke his leg during a game. The other boy was smaller, looked like a nerd wearing horn-rimmed glasses, and broke his leg by slipping on the ice while walking his dog. After having their fractures reduced and casted, the two boys shared a room for a couple of days. The football player had several good-looking coeds visiting him, while the only visitor the other boy had was his mother; consequently, he was quite jealous. Six weeks later, the boys met again when it was time to have their casts removed. This occurred right after lunch; the football player ate a huge lunch, including a steak sandwich, while the other boy only had a salad. As the casts came off, the football player fainted dead away as soon as the cast was cracked open while the other boy simply got up on his crutches after the cast was removed and walked out. That he didn't faint while the tough football player did made him feel superior. Which one of the following choices was most probably responsible for the fainting incidence?

1. The football player was a sissy.
2. Orthostatic hypotension
3. The football player had hypertropic cardiac myopathy.
4. A vasovagal response ✔
5. A postprandial rush of blood to the digestive system

INCORRECT ✖

The correct answer is 4.

Syncope is caused by decreased blood flow to the brain. Passing out when blood flow to the brain is compromised for even a few seconds is a physiological defense mechanism; by assuming a prone position it becomes easier for the heart to pump blood to the head, and typically the person rapidly wakes from the faint. While the initiating factor may be something worrisome, as a rule a faint is triggered by something relatively innocuous, very often a vasovagal response to some emotional or physical factor. Vagus activation lowers blood pressure and slows the heart rate, momentarily limiting blood flow to the brain. In the case described, the triggering factors are a physical response to the sudden release of the pressure caused by splitting the cast plus the emotional response caused by first seeing the atrophied state of the lower limb being exposed. Common triggering factors include emotional stresses such as fear, having blood drawn, watching an operation or childbirth, loss of a loved one, a first kiss, etc.; or physical factors such as pain, having a difficult bowel movement, lifting weights, etc.

(Choice 1) Although feeling that the football player was a sissy may help the other boy's ego, it obviously has little to do with his fainting.

(Choice 2) is a common cause of syncope, or at least of dizziness. When a person stands up, blood is drawn down into the legs by gravity; it has been estimated that this can result in as much as 20% of the total circulating volume being delivered to the legs, briefly depriving

the heart, and consequently the brain, of that volume. Since the boy would be sitting while the cast was split, this could not be the mechanism responsible for his faint.
(Choice 3) A cardiac problem such as ventricular fibrillation, a defective valve, or hypertropic cardiac myopathy could also cause a faint or even worse; however, such serious triggers are rare, particularly in a healthy young person.
(Choice 5) A postprandial rush of blood to the digestive system could also cause a faint but in itself is an unlikely cause; however, it may have been a contributing factor in the case described since eating a heavy meal would have directed more blood to the digestive system prior to the stress of having his cast split.

36. Question

1 points

A married, 22-year-old fourth-year medical student from southern California was accepted into an externship at the Mayo Clinic in Rochester, Minnesota. Not being used to Minnesota's weather, he walked to work coatless on a fall morning. By the time he left to go home, night had fallen and an early storm had come in, dropping the temperature into the freezing range with a cold wind bringing rain and sleet. Trying to hurry and to keep warm, he slipped stepping off of a curb and lay stunned with a twisted ankle for some time before being found by a nurse who got him on his feet and took him to her home, which was only a few yards away. Although he felt half frozen and his ankle hurt, once he warmed up he felt fine and, in fact, he and the nurse entered into a sexual relationship. As it happened, this nurse had rheumatoid arthritis. About a month later, by the time he got back to California, he was suffering from a variety of symptoms including pain in his legs and feet, including acute tendinitis in his Achillis tendons; spondylitis and sacroiliitis; and pink eye with irritation and pain. Blood tests showed he was positive for HLAB27 but negative for rheumatoid factor and antinuclear antibodies, and he had an elevated erythrocyte sedimentation rate. The student most likely suffered from which one of the following conditions?

1. Rheumatoid arthritis caught from the nurse
2. Rheumatoid arthritis that developed because of his exposure to the cold
3. Reactive arthritis ✔
4. Ankylosing arthritis
5. Psoriatic arthritis

INCORRECT ✖
The correct answer is 3.
Reactive arthritis, formerly known as Reiter's syndrome, commonly surfaces several weeks after a bacterial infection. In males, this is most commonly due to a venereal infection, most often with Chlamydia trachoma; however, it may be triggered by different organisms, and

less often, in both sexes, by digestive tract infections. The name reactive arthritis was coined because the symptoms are a reaction to such an infection. Typically, large joints, such as the lower back, hips, knees, and ankles are affected, often with Achilles tendonitis and/or plantar fascitis. Additionally, conjunctivitis or even uveitis frequently occurs. A small percentage of affected individuals develop small hard nodules on the soles of their feet and less often on their palms, as well as mouth ulcers. Approximately 20%–40% of affected men develop shallow ulcers on the head of the penis, as well as a penile discharge. To treat the arthritis, the infection must first be cured; initially, the pain is treated with analgesics. As a rule, the symptoms are self-limiting but those that linger on must be treated accordingly.
(Choices 1 & 2) are incorrect. Rheumatoid arthritis is not contagious; thus, it could not have been caught from the nurse; neither could it develop due to exposure to cold. Consequently, **(Choice 2)** is also incorrect.
(Choices 4 & 5) Ankylosing arthritis and psoriatic arthritis are classified as spondyloarthropathies, along with Crohn's disease, ulcerative colitis, and reactive arthritis because of similarities, but all have identifying distinctive clinical presentations.

37. Question

1 points

During a routine update appointment an 81-yearold male type 2 diabetic hesitantly mentions to his family practice physician that lately he has been having problems with voiding urine. His major problems are that, under certain conditions, he cannot stop his bladder from emptying and also that the head of his penis had become irritated. With regards to the latter, he adds that the reddish color of the head of his penis reminded him of the diaper rash his son had; consequently, he thought it might help if he wiped his penis after urinating, and it did. In further describing his inability to inhibit voiding at will, he noted some typical conditions that caused him problems: Often, when he approached the toilet to void he would start to urinate before he could get his penis fully out of his pants, wetting his clothing and sometimes even onto the floor. He also found that certain external factors sometimes triggered loss of urine at inappropriate times, as when stepping into a cold environment or simply upon hearing running water. Which one of the following choices best describes the type of urinary incontinence that this man suffers from?

1. Stress incontinence
2. Overactive bladder ✔
3. Overflow incontinence
4. Functional incontinence
5. Structural incontinence

INCORRECT ✖

The correct answer is 2.
The International Continence Society defines overactive bladder (OAB) as a syndrome of symptoms consisting of urgency with or without urgency urinary incontinence (UUI), often associated with urinary frequency and nocturia. Studies demonstrate that the prevalence rate for OAB ranges from 11.8% to 16.9%, increases dramatically with age, and is similar for both sexes. Despite the personal and societal costs, it remains underreported and undertreated; it has been estimated that only about 60% of cases are reported to physicians, and only about 27% are treated. Patients tend to avoid reporting incontinence problems because of embarrassment, a feeling that it is a normal consequence of aging, that there is no available treatment, and/or that no major morbidity is associated with it. Primary care physicians may avoid screening questions because they feel uncovering idiopathic incontinence will only reveal a nonvital condition to deal with in the short time allotted by Medicare standards. The initial goal in evaluating OAB is to determine whether it is idiopathic or if it is due to some specific underlying disease state that could be treated. However, once recognized, even idiopathic OAB is treatable. The first step is education and behavioral therapy; although this alone will not cure the condition, a patient may learn behaviors that will help keep his or her pants dry. Refractory cases are often treated with antimuscarinic drugs; however, long-term adherence is low because of uncomfortable side effects.
(Choice 1) is the loss of urine due to extra pressure on the bladder caused by coughing, laughing, lifting something heavy—anything that creates extra pressure within the abdominal cavity, which then presses down upon the bladder. Normally, the sphincter muscles tighten up to prevent urine leakage when so stressed; however, if the muscles and ligaments of the pelvic floor are lax, the urethra has nothing to compress against as the bladder is pressed downward and leakage can occur. This condition is more common in women than in men as vaginal childbirth is a contributing factor.
(Choice 3) occurs when the urethra is obstructed or if the bladder muscle contractions are weak, thus preventing complete voiding. As a result, the bladder becomes too full and eventually urine leaks out. This condition is most common in men because of an enlarged prostrate that blocks urine flow through the urethra. In women, this condition can occur in cases of prolapse of the uterus or bladder, creating a kink in the urethra.
(Choice 4) Patients with functional incontinence have a normal urinary system but have mental or physical limitations that sometimes prevent them from getting to the toilet in time.
(Choice 5) relates to structural problems in the urinary system resulting in leakage. These are rare. Congenital anomalies are generally dealt with during infancy; structural problems arising in adulthood are generally due to accidents or wounds.

38. Question **1 points**

A 23 year old woman comes to the physician for a health maintenance examination. She enjoys good health and exercises regularly. Her height is 172 cm (68 in) and weight is 66 kg (145 lb). Her blood pressure is 120/80 mm Hg, pulse is 74/min, and respirations are 12/min. Physical examination is unremarkable except for heart auscultation, which reveals an isolated midsystolic click. Which of the following is the most common cause of this auscultatory finding?

1. Bicuspid aortic valve
2. Congenital pulmonary stenosis
3. Mitral valve prolapse ✔
4. Ruptured papillary muscle
5. Tricuspid regurgitation

INCORRECT ✖

The correct answer is 3.

The most characteristic manifestation of a floppy mitral valve (myxomatous degeneration – mitral valve prolapse) is a midsystolic click. This frequently asymptomatic condition may be associated with chest pain, dyspnea, palpitations, and other nonspecific symptoms. Patients with a midsystolic click as the only sign are usually asymptomatic; however, those with a systolic murmur may have thermodynamically significant mitral valve regurgitation. In addition, mitral valve prolapse is associated with an increased incidence of infective endocarditis, arrhythmias, sudden death, and cerebral embolism.

(Choice 1) is the most frequent type of congenital defect of the aortic valve. It may manifest with valvular stenosis, giving rise to a systolic murmur sometimes associated with an opening click.

(Choice 2) is a rare condition that gives auscultatory signs similar to aortic stenosis, i.e., a harsh systolic click sometimes associated with an opening click.

(Choice 4) may develop as a complication of infective endocarditis or myocardial infarction. It may lead to mitral or tricuspid regurgitation and thus manifest with a systolic murmur not associated with clicks.

(Choice 5) manifests with a harsh systolic murmur that increases in intensity during inspiration. The most common cause is right ventricular overload; less common causes are infective endocarditis and right ventricular myocardial infarction.

39. Question

1 points

A 50 year old man comes to the physician because of gingival bleeding, epistaxis, and fever for 2 days. He appears acutely ill. His temperature is 39 °C (102 °F), blood pressure is 120/70mm Hg, pulse is 120/min, and respirations are 22/min. Bilateral rhonchi are heard on chest examination. He is admitted for further evaluation. Chest x-ray shows bibasilar infiltrates consistent with bronchopneumonia. Blood tests show 12,000 leukocytes/mm^3 with numerous myeloid blasts. Platelet count is 15,000/mm^3 A bone marrow biopsy demonstrates hypercellular marrow, with 35% blasts. Elongated cytoplasmic inclusions consistent with Auer rods are appreciated in peripheral and marrow blasts. Which of the following is the most likely diagnosis?

1. Acute lymphocytic leukemia (ALL)
2. Acute myelogenous leukemia (AML) ✔
3. Chronic myelogenous leukemia (CML)
4. Leukemoid reaction
5. Myelodysplastic

INCORRECT ✖

The correct answer is 2.

The clinical manifestations are consistent with acute myelogenous leukemia (AML). This disease of middle-aged people (median age at presentation is 50 years) is due to neoplastic transformation of a bone marrow stem cell that is incapable of differentiating into mature leukocytes. A large number of blasts invades the bone marrow and the peripheral blood. AML is subdivided into seven types with different prognostic and therapeutic implications. These types are determined on the basis of the degree of maturation of blasts, their morphology, and coexisting cytogenetic abnormalities. Leukocytosis may be mild or even absent ("aleukemic leukemia"). However, most of the circulating leukocytes are blasts or immature myeloid forms. Signs and symptoms result from neutropenia, anemia, and thrombocytopenia. Auer rods consist of eosinophilic, needle-like inclusions in myeloid cells and are pathognomonic of AML.

(Choice 1) In contrast to AML, acute lymphocytic leukemia (ALL) is a disease of children, with a peak of incidence from 3 to 7 years. ALL represents 80% of all cases of acute leukemia in children. The clinical presentation is similar to that of AML. The lymphocytic nature of blasts is confirmed by demonstrating lymphocytic markers, such as terminal deoxynucleotide transferase (TdT).

(Choice 3) Chronic myelogenous leukemia (CML) is also a disorder of middle-aged persons. Neoplastic bone marrow precursors in this condition are still capable of differentiating along myeloid lines, so that most circulating leukemic cells appear as mature white blood cells. CML is a myeloproliferative disorder, so the platelet. count and erythrocyte count are usually normal or even increased. Leukocytosis in CML is usually striking, often higher than 500,000/mm^3. The Philadelphia chromosome, the result of a balanced translocation between 9q and 22q, is present in 95% of cases.

(Choice 4) is defined as an abnormal elevation of the white cell count in response to infections. Circulating leukocytes, however, are normal in morphology and never exceed 50,000/mm^3. Leukocyte alkaline phosphatase is useful in differentiating leukemoid reaction from myeloid leukemia. The enzyme is elevated in leukemoid reaction but low in leukemia.

(Choice 5) Myelodysplastic syndromes constitute a complex set of bone marrow disorders, in which at least two cell lines are affected. These conditions are characterized by cytopenias (anemia, thrombocytopenia, and/or neutropenia) associated with hypercellular bone marrow. Cytopenias are due to ineffective hematopoiesis. The progression is usually indolent, but transformation to acute leukemia occurs in some cases.

40. Question **1 points**

A 48 year old man comes to the physician because of a 2-day history of severe low back pain. He states that he has had periodic low back pain for years, but this is more severe than usual and radiates to the buttock and down the right leg. His temperature is 36.8 C (98.2 F). Examination shows some rigidity of the lumbar spine. The pain is exacerbated by applying pressure on the paravertebral region in the lower lumbar spine and by passively raising the leg at 45 degrees while the patient lies supine. A reduced Achilles tendon reflex is noted. Which of the following is the most appropriate next step in management?

1. MRI examination of vertebral column
2. Nonsteroidal anti-inflammatory drugs (NSAIDs) and 2 days of bed rest ✔
3. Plain x-ray examination of the lumbosacral spine
4. Radionuclide bone scanning
5. Surgical consultation

INCORRECT ✖

The correct answer is 2.

The clinical picture strongly suggests herniation of an intervertebral disc causing compression of a spinal root (SI, considering radiation of the pain and reflex alterations). Supporting such a diagnosis is also the positive straight leg-raising test (Lasegue sign).When the history and physical examination support a diagnosis of disc herniation, conservative management is all that is needed. Current recommendations include treatment with NSAIDs and bed rest of short duration (no longer than 2 days). Longer periods of bed rest do not provide any additional benefit.

(Choice 1) is certainly the diagnostic procedure of choice to visualize soft tissue structures of the vertebral column. MRI is reserved for cases in which more detailed imaging information would change the therapeutic approach.

(Choice 3) Plain x-ray examination of the lumbosacral spine provides nonspecific information. Almost any person older than 40 has some signs of degenerative joint disease of the lumbar column. Plain radiographs should be performed when the clinical symptomatology suggests diseases other than disc herniation, such as tumors or infections.

(Choice 4) is useful in detecting foci of osteomyelitis or bone metastases, but not disc disease.

(Choice 5) should be sought if the patient does not respond to appropriate treatment or if there are severe or evolving neurologic deficits. Percutaneous lumbar discectomy may be performed under local anesthesia as an alternative to laminectomy.

41. Question **1 points**

A previously healthy 30 year old man is injured in an automobile accident. He is taken to the emergency department, where he is noted to have multiple lacerations of his extremities, some of which are bleeding profusely. His blood pressure is 70/palpable mm Hg. The decision is made to transfuse 2 units of blood after rapid cross-matching. No reactions are detected in the blood bank. Ten minutes after the transfusion, the patient develops a severe case of hives. The development of hives in this setting would be most likely to be seen in a patient with which of the following syndromes?

1. Adenosine deaminase deficiency
2. Ataxia telangiectasia
3. DiGeorge syndrome
4. Selective IgA deficiency ✔
5. Wiskott-Aldrich syndrome

INCORRECT ✖

The correct answer is 4.

Selective IgA deficiency is a relatively common condition (1 in 700 incidence in Caucasians), in which patients are genetically unable to synthesize IgA for either serum or bodily secretions. The underlying defect is a failure of B cells to differentiate into IgA-producing plasma cells. Most individuals with selective IgA deficiency are asymptomatic; about 5% have recurrent respiratory tract infections. The condition becomes clinically significant when blood transfusion is required, since they may develop anaphylaxis when exposed to blood products containing IgA. This can happen even on the first transfusion, presumably because they have been exposed to IgA in animal products that they have eaten. The condition can be confirmed with serum electrophoresis studies, which show an absence of IgA. Once diagnosed, the individuals (and families) need to be taught to tell their physicians about the IgA deficiency, so that only IgA free transfusions will be used.

(Choice 1) is a cause of severe combined immunodeficiency.

(Choice 2) is characterized by cerebellar ataxia, telangiectasias, and immunodeficiency.

(Choice 3) is characterized by hypoparathyroidism, thymic aplasia, and deficient T cell function.

(Choice 5) is characterized by thrombocytopenia, lymphopenia, and atopic eczema.

42. Question **1 points**

A 30 year old woman complains of fatigue and dyspnea for the past 2 months. She reports that she has also lost 15 pounds during this time. She has been previously healthy and is not taking any medications. She is pale and thin and has a flow murmur on her cardiac examination. She also has mildly enlarged supraclavicular lymph nodes. Laboratory results are notable for a hematocrit of 30%, mean corpuscular volume (MCV) of 78 μm^3, decreased transferrin iron binding capacity (TIBC), and increased ferritin. A screening erythrocyte protoporphyrin level is <35 µg/dL, and a blood smear shows microcytic red cells. Which of the following is the most likely diagnosis?

1. Anemia of chronic disease ✔
2. Aplastic anemia
3. Lead poisoning
4. Pyridoxine deficiency
5. Spherocytosis
6. Thiamine deficiency

INCORRECT ✖

The correct answer is 1.

This is anemia of chronic disease. In contrast to iron deficiency anemia, the TIBC is decreased, but ferritin is increased. The microcytosis is the same as in iron deficiency. This patient may have an infection or an occult malignancy and needs further workup for the loss of weight.

(Choice 2) can be the result of exposure to drugs, such as chloramphenicol, that can lead to the suppression of erythrocyte production. A low reticulocyte count, which is an indication of immature red cells, can be helpful in diagnosis of this illness. Bone marrow biopsy may show hypocellularity of the marrow.

(Choice 3) occurs following the inhalation of lead dust or fumes or following the ingestion of lead. Presentation in these patients ranges from abdominal discomfort, myalgia, headache, and weight loss to peripheral neuropathy and encephalopathy. Laboratory studies show a normal serum iron, a normal TIBC, and basophilic stippling on peripheral blood smear. A screening erythrocyte protoporphyrin level is >35 µg/dL, indicating the need for blood lead testing.

(Choice 4) Pyridoxine is a cofactor in the manufacture of Porphyrins, which are needed in the manufacture of hemoglobin. Therefore, pyridoxine deficiency may cause a microcytic hypochromic anemia, but the laboratory panel above is characteristic of anemia of chronic disease.

(Choice 5) Hereditary spherocytosis is a genetic defect arising from mutations in red cell cytoskeletal proteins. This leads to a cell wall defect, which in turn leads to removal of excess cell wall in the spleen. Surface tension causes these cells to become spheres.

(Choice 6) has been implicated in a rare megaloblastic anemia in children. It is also seen in malnourished alcoholics, and intramuscular repletion is often required.

43. Question **1 points**

A 50 year old man comes to the physician because of an unusual appearing mole on his upper back. He says that his wife has noted a recent change in its color and shape. The lesion measures 0. 7 cm and has ill-defined margins and irregular pigmentation. The patient is otherwise healthy and takes no medication. Which of the following is the most appropriate next step in management?

1. Follow-up examination in 6 months
2. Topical application of Podophyllum resin
3. Cryotherapy with liquid nitrogen
4. Shave biopsy
5. Incisional biopsy
6. Excisional biopsy ✔

INCORRECT ✖

The correct answer is 6.

The gross appearance of the lesion, along with its recent changes over a presumably short period, is highly suggestive of malignant melanoma. The proportion in which melanomas arise from pre-existing benign nevocellular nevi is not known. In the dysplastic nevus syndrome, however, a dysplastic nevus-melanoma sequence is well established. Nevertheless, an excisional biopsy should be carried out in any case of pigmented skin lesion that shows one or more of the following features: asymmetric or fuzzy border, irregular or variegated color, and diameter greater than 0.6 cm. According to the American Cancer Society, the mnemonic ABCD may serve to recall the most important suspicious signs: Asymmetry, Border irregularity, Color variegation, and Diameter >0.6 cm. Bleeding and ulcerations are malignant signs, albeit far less frequent. Melanoma is the most common cause of death due to skin malignancies. Physicians can play a crucial role in prevention by referring to dermatologists patients who have moles with such suspicious features. The initial approach to a suspicious mole or clinically obvious melanoma consists of total excision (excisional biopsy) with a small margin. If a diagnosis of melanoma is confirmed pathologically, wider margins are excised on a second operation.

(Choice 1) would result in a dangerous delay in diagnosis and treatment.

(Choices 2 & 3) Topical application of Podophyllum resin and cryotherapy with liquid nitrogen are treatments used for common and genital warts, as well as for other common benign lesions, such as seborrheic keratosis. These methods should never be used on pigmented lesions.

(Choice 4) is applicable to many types of superficial skin lesions, including basal cell carcinomas, but is inappropriate for melanomas. Proper diagnosis and evaluation of depth of

invasion in melanomas can be achieved only on full-thickness biopsies.
(Choice 5) Incisional biopsy (i.e., partial sampling) is not appropriate unless the lesion is too extensive (such as giant congenital nevi or lentigo maligna). However, there seems to be no foundation for the belief that incisional biopsy facilitates cancer spread.

44. Question

1 points

A 52 year old man with a history of chronic low back pain complains of 3 days of a cough productive of purulent sputum, fever, and left-sided subcostal pain worsened by breathing. A single episode of shaking chills accompanied the onset of the illness. He has no gastrointestinal complaints. His temperature is 40 °C (104 °F), blood pressure is 160/80 mm Hg, pulse is 100/min, and respirations are 38/min with nasal flaring and splinting. The cardiac and abdominal examinations are within normal limits. There are moist crackles and egophony at the left lung base. A chest x-ray film shows a left lower lobe infiltrate. Gram stain of the sputum shows multiple polymorphonuclear leukocytes and occasional epithelial cells. Which of the following is the most likely pathogen?

1. Gram-negative diplococci
2. Gram-negative rods
3. Gram-positive cocci in clusters
4. Gram-positive diplococci in chains ✔
5. Gram-positive rods

INCORRECT ✖

The correct answer is 4.

This patient is demonstrating the classic picture of pneumococcal pneumonia. Streptococcus pneumoniae is the most common cause of community-acquired pneumonia in this age group. The usual presentation is sudden onset of shaking chills, with rigors, high fever, and difficulty breathing. Pleuritic chest pain is often present and signifies bacterial infection. A white blood cell count, not provided in this case, most often is significantly elevated with a left shift (predominantly bands and polymorphonuclear cells). Chest x-ray films usually reveal a lobar distribution of the pneumonia. Pleural effusions are present in up to 30% of the cases. Gram stain of the sputum commonly reveals gram-positive diplococci in chains.
(Choice 1) would be present in pneumonia due to Moraxella catarrhalis (formerly Branhamella catarrhalis). This pathogen may produce acute pneumonia and usually occurs in the elderly or in those with a history of chronic bronchitis or obstructive lung disease.

(Choice 2) is not a usual cause of pneumonia in this population of patients. Gram-negative rods causing pneumonia include Klebsiella, Enterobacter, Serratia, and Proteus, which occur more commonly in patients who are debilitated or residing in nursing homes or similar institutions. These bacteria are often responsible for nosocomial pneumonias and, infrequently, community-acquired pneumonia.
(Choice 3) Gram-positive cocci in clusters that cause pneumonia are usually Staphylococcus aureus. S. aureus is an uncommon cause of community-acquired pneumonia. When it does cause disease, it is usually during or just following an epidemic of viral influenza. S. aureus may be seen year-round in the hospital, because it is a common cause of nosocomial pneumonia.
(Choice 5) would likely be Corynebacterium diphtheriae (diphtheria). This patient presents with pneumonia, not diphtheria (an infection that occurs in the pharynx, middle ear, larynx, skin, or bronchi).

45. Question

1 points

A 50 year old man returns to his home in Minnesota after a diving trip to Belize (Central America). The day after his return, he comes to the physician because of diarrhea, abdominal cramps, and nausea. His temperature is 37 °C (98.6 °F). His stools do not contain mucus or blood. Microscopic examination of a stool sample reveals no leukocytes. Which of the following is the most likely pathogen?

1. Bacillus cereus
2. Clostridium perfringens
3. Escherichia coli ✔
4. Rotavirus
5. Staphylococcus aureus

INCORRECT ✖

The correct answer is 3.

Traveling abroad often entails abrupt changes in diet and climate, as well as exposure to conditions of poor sanitation, all of which results in a high incidence of diarrhea. This is self-limiting and manifests with watery diarrhea and dehydration, but no fever or other signs of systemic infection. The most frequent cause of traveler's diarrhea is enterotoxigenic Escherichia coli.
The remaining infectious agents listed here are all potential causes of noninflammatory diarrhea, which is not associated with blood and mucus in the stool, fever, systemic signs of infection, or fecal leukocytes.

(Choices 1,2 & 5) Bacillus cereus, Clostridium perfringens, and Staphylococcus aureus, along with enterotoxigenic E. coli, are the most common agents associated with food poisoning due to production of toxins. All these pathogens produce a similar clinical picture of watery diarrhea, sometimes with nausea and vomiting, but no fever.
Rotavirus **(Choice 4)** is one of the most important infectious causes of diarrhea in infants and young children in developing countries. It may also cause diarrhea in adults exposed to infected children.

46. Question

1 points

A 65 year old man with a history of peripheral vascular disease develops thromboembolic disease in his left leg accompanied by dry gangrene. Laboratory tests show elevated serum lactic acid, and his arterial pH is 7.27. An ECG in this patient is most likely to show which of the following?

1. Peaked T waves ✔
2. QT prolongation
3. ST depression
4. T wave inversion
5. U waves

INCORRECT ✖

The correct answer is 1.

Peaked T waves are associated with significant hyperkalemia that may lead to arrhythmia. In this patient, the primary mechanism of hyperkalemia is acidosis. As a result of the lowered pH, the extracellular concentration of protons increases, thereby increasing the H^+/K^+ antiports on the cell surface, driving protons into the cells and potassium into the extracellular space. ECG changes are an indication for immediate correction of the hyperkalemia, indicating can increased risk of arrhythmia. Calcium gluconate should be administered to decrease membrane excitability.
(Choice 2) Hypocalcemia causes prolonged QT intervals. The QT interval is the time difference between ventricular depolarization and repolarization. Since the QT interval depends on the heart rate, the corrected QT interval (QTc) is often used. The correction factor incorporates the interval between consecutive P waves.
(Choice 3) would be seen in an ischemic event. It is important to compare the new ECG with an old one to determine whether the depression is new. If this is the case, the patient with such ECG changes should at least be placed on aspirin and observed for an ischemic event.

(Choice 4) is another indication that the patient may be undergoing an ischemic event. Once again, it is important to compare the new ECG with an old one. Furthermore, if the new ECG shows upright T waves, but the old one shows inverted T waves, this denotes "pseudonormalization" and once again indicates an ischemic event.
(Choice 5) U waves are seen in hypokalemia. If an ECG shows these changes, the risk of an arrhythmia is significant, and the hypokalemia must be corrected immediately. This can usually be achieved by administering oral potassium, but occasionally IV potassium may be required.

47. Question

1 points

A 35 year old man has had nocturnal attacks of severe periorbital headache for the past 5 days. Each episode awakens him at night within 2 hours of falling asleep, lasts for less than an hour, and is associated with ipsilateral rhinorrhea and lacrimation. There is no family history of similar headaches. Careful evaluation does not reveal any objective evidence of neurologic dysfunction. The pupils are equal and normally reactive to light. His temperature is 37 °C (98.6 °F), blood pressure is 125/75 mm Hg, and pulse is 72/min. Which of the following is the most likely diagnosis?

1. Cluster headache ✔
2. Depression headache
3. Giant cell arteritis
4. Migraine
5. Tension headache
6. Trigeminal neuralgia

INCORRECT ✖

The correct answer is 1.

The clinical presentation is characteristic of cluster headache. In its classic form, cluster headache manifests as nocturnal attacks that last between 30 minutes and 2 hours. These are often precipitated by alcohol consumption and recur daily for up to 8 weeks. Each "cluster" is then followed by a pain-free interval lasting for 1 year on average. The pathogenesis is probably related to disturbances of the serotoninergic pathways originating from the raphe nuclei. Acute attacks may be shortened by oxygen, sumatriptan, and ergotamine preparations; several prophylactic agents are available to prevent clusters.
(Choice 2) is often worse in the morning and is frequently associated with other manifestations of depression.
(Choice 3) The headache due to giant cell arteritis usually manifests in elderly patients and is associated with scalp tenderness over the affected superficial temporal artery. Systemic

signs and symptoms are present, including myalgia, weight loss, and malaise. The erythrocyte sedimentation rate is elevated.
(Choice 4) Classic cases of migraine begin in early adulthood and manifest as episodic unilateral throbbing headache, often associated with nausea, photophobia, and visual symptoms.
(Choice 5) Tension headache has a diffuse, band-like character and feels worse in the back of the head. Pain slowly increases and may last for many hours or even days.
(Choice 6) Trigeminal neuralgia is a disorder of the sensory nucleus of CN V that produces episodic, severe, and lancinating pain in the distribution of one or more divisions of the trigeminal nerve. Pain is often precipitated by well defined trigger zones (e.g., washing or shaving) and is not associated with Horner syndrome or rhinorrhea.

48. Question

1 points

A 32 year old African American woman complains of mild fevers and fatigue for the past month. She has no significant past medical history. Her temperature is 38.1 °C (100.6 °F), blood pressure is 115/70 mm Hg, pulse is 75/min, and respirations are 18/min. Nontender, mobile, cervical and axillary lymph nodes are noted. Auscultation of the lungs reveals fine crackles bilaterally. A chest x-ray film shows hilar lymphadenopathy and diffuses interstitial infiltrates. Lymph node biopsy shows non caseating granulomas. Which of the following is the most appropriate therapy?

1. Allopurinol
2. Angiotensin converting enzyme (ACE) inhibitor
3. Cyclosporine
4. Glucocorticoids ✔
5. Isoniazid

INCORRECT ✖
The correct answer is 4.
This patient has pulmonary sarcoidosis. The peak age group for sarcoidosis is 20-40 years, and the disease seems to be more common in blacks. Non caseating granulomas can occur in the lungs, heart, kidneys, skin, liver, or other organs. Most characteristically, the patients are asymptomatic, and the disease is detected by an abnormal chest x-ray film, which usually shows bilateral symmetric hilar adenopathy often associated with paratracheal adenopathy and/or parenchymal infiltrates. Patients may have uveitis, peripheral arthritis, skin involvement with granulomas, or erythema nodosum. The lungs are the most frequently involved organ; pulmonary symptoms, when present, include dyspnea on exertion, nonproductive cough, and wheezing. Radiologic abnormalities are graded 0-3. Grade 0 is

associated with a normal x-ray. Grade 1 is associated with lymph node enlargement without pulmonary parenchymal abnormalities. Grade 2A is a combination of lymph node and diffuse pulmonary parenchymal disease. Grade 2B is a diffuse parenchymal disease without lymph node enlargement. Grade 3 is associated with radiographic changes indicating more chronic disease with pulmonary fibrosis ("honey-combing"). Many patients show spontaneous total remission of disease for a period up to 3 years. Prednisone is usually the drug of choice for treatment, with a starting dose of 30-40 mg/day.

(Choices 1 & 3) Neither allopurinol nor cyclosporine, an immune modulator, has been proven to be of benefit in sarcoidosis.

(Choice 2) Levels of ACE may be elevated in patients with sarcoidosis but are also elevated in many other diseases. This enzyme elevation is thought to be related to induction by the granulomas. There is no evidence that ACE inhibitors have any therapeutic value in treatment of sarcoidosis.

(Choice 5) At one point in history, some theorized that sarcoidosis was caused by a type of mycobacterium, related to tuberculosis. However, this has not been definitively proven. Furthermore, isoniazid has not been shown to be beneficial.

49. Question

1 points

A 20 year old man comes to the physician because he has noticed blood in his urine on several occasions in the past year. Each episode of hematuria occurred in association with an upper respiratory tract infection or a flulike illness. Physical examination is unremarkable. A urine dipstick test shows mild proteinuria and microhematuria. Serum levels of electrolytes, creatinine, and blood urea nitrogen are within normal limits. Serum levels of IgA are elevated. Which of the following is the most likely diagnosis?

1. Berger disease ✔
2. Goodpasture syndrome
3. Henoch-Schonlein purpura
4. Minimal change disease
5. Postinfectious glomerulonephritis
6. Wegener granulomatosis

INCORRECT ✖

The correct answer is 1.

The clinical presentation is consistent with Berger disease or IgA nephropathy, the most frequent form of glomerulonephritis worldwide. Often, microhematuria or mild proteinuria occurs as an incidental finding or as recurring episodes following upper respiratory or

intestinal infections. IgA deposition in the mesangium is the most characteristic morphologic abnormality, and serum IgA is increased in 50% of patients (hence the designation). Up to 50% of patients will eventually progress to chronic renal failure.
(Choice 2) typically involves both the lungs and kidneys. Hemoptysis and nephritic syndrome are the clinical manifestations. Linear deposition of anti-collagen antibodies along the glomerular and pulmonary basement membranes is the pathognomonic finding on biopsy. This is a severe condition that requires aggressive immunosuppressive treatment.
(Choice 3) The renal changes of Henoch-Schonlein purpura are very similar to those of Berger disease. These conditions, in fact, are thought to represent different manifestations of a common spectrum of diseases, in which autoimmune damage is mediated by IgA. In Henoch-Schonlein purpura, nephritic syndrome is associated with palpable purpura, arthralgias, and abdominal pain. The disorder usually affects children.
(Choice 4) Minimal change disease is characterized by edema, albuminuria, and changes in blood lipids and proteins. It is usually seen in children, and it doesn't present with episodic hematuria. Proteinuria is of the nephrotic range.
(Choice 5) Postinfectious glomerulonephritis commonly occurs 1-2 weeks after an infection by group A Streptococcus (pharyngitis or impetigo) and manifests with nephritic syndrome. Hematuria developing in the setting of Berger disease, instead, is concomitant with an upper respiratory infection (so-called sympharyngitic hematuria).
(Choice 6) Wegener granulomatosis is a necrotizing granulomatous vasculitis involving the upper respiratory system and the kidneys. Systemic symptoms are present, with fever, weight loss, and malaise. Aggressive immunosuppression is the mainstay of therapy.

50. Question

1 points

A 60 year old woman presents to a physician complaining of a swelling in her neck. Her past medical history is significant for rheumatoid arthritis and Sjogren syndrome. Physical examination reveals a mildly nodular, firm, rubbery goiter. Total serum thyroxine (T4) is 10 mg/dL, and third-generation thyroid-stimulating hormone (TSH) testing shows a level of 1.2 mIU/mL. Antithyroid peroxidase antibody titers are high. Which of the following is the most likely diagnosis?

1. Euthyroid sick syndrome
2. Graves disease
3. Hashimoto thyroiditis ✔
4. Silent lymphocytic thyroiditis
5. Subacute thyroiditis

INCORRECT ✖

The correct answer is 3.

Hashimoto disease is a chronic, destructive lymphocytic infiltration of the thyroid glands. It has an 8: 1 female predominance and increases in incidence with age. Many patients also have other autoimmune diseases. The description of the goiter in the question stem is typical of that produced by Hashimoto disease; the physical signs and symptoms of hypothyroidism are also present in longer-standing cases. Early in the disease, as in this case,T4 and TSH levels may be normal. Antithyroid peroxidase antibodies (against the specific antigen formerly detected with antimicrosomal antibodies) are observed in almost all patients with Hashimoto disease, but can also sometimes be detected in patients with Graves's disease and silent lymphocytic thyroiditis.

(Choice 1) occurs in patients with severe systemic illness who are clinically euthyroid but have abnormal thyroid function tests.

(Choice 2) causes diffuse toxic goiter and would exhibit both the signs and laboratory findings of hyperthyroidism.

(Choice 4) usually occurs in postpartum women and may be a mild, usually spontaneously reversible, variant of Hashimoto disease.

(Choice 5) is a virally caused acute inflammatory disease that causes thyroid tenderness and pain.